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ON

## SEAMANSHIP.

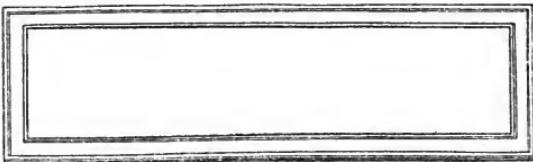
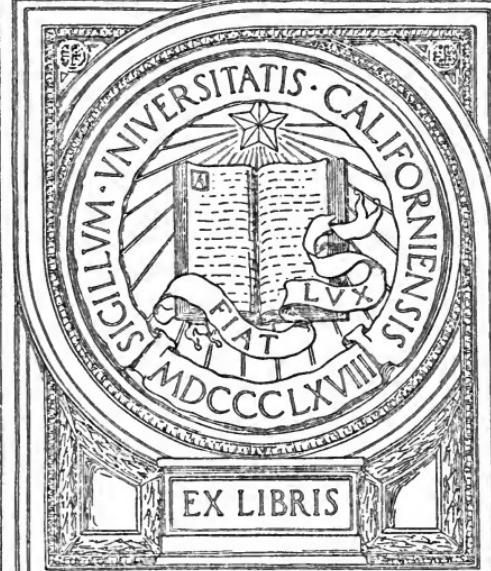
PLATES OF THE INTERNATIONAL CODE OF SIGNALS  
BRITISH SIGNAL MANUAL, ETC., ETC.

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THE NEW

# EXAMINER IN SEAMANSHIP

BEING THE SEAMANSHIP REQUIRED OF CANDIDATES FOR  
CERTIFICATES OF COMPETENCY BOTH IN THE ORDINARY AND EXTRA  
EXAMINATIONS, ARRANGED IN QUESTIONS AND ANSWERS.

WITH PLATES OF THE INTERNATIONAL CODE OF  
SIGNALS, BRITISH SIGNAL MANUAL, ETC.

BY THOMAS L. AINSLEY,

TEACHER OF NAVIGATION, AND AUTHOR OF "A GUIDE BOOK TO THE LOCAL MARINE BOARD  
EXAMINATIONS," "THE EXTRA MASTER'S GUIDE BOOK," "THE  
ENGINEER'S MANUAL, ETC.

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## ADVERTISEMENT TO THE FORTY-EIGHTH EDITION.

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### AINSLEY'S NAVIGATION SCHOOL.

In thoroughly revising and enlarging this Edition, my aim has been to furnish a complete and up-to-date text book for Candidates preparing for the Board of Trade Examinations. The rapid sale of the 47th edition of this book is proof of its success in still retaining its popularity as a standard work on Seamanship.

Many important additions have been made, including full explanations and illustrations of the "British Signal Manual," a thorough knowledge of this Code being necessary to pass a creditable examination.

The "International Code of Signals" has received special attention, numerous examples with illustrations having been clearly set out.

A chapter on Miscellaneous Questions has been compiled, the Answers to which can only be ascertained by careful reading of the various chapters.

The Winds and Currents of the Globe and Ocean Passages are not included, as two excellent text books, recommended by the Board of Trade, by Captain JACKSON, R.N., have been published; also, Barometer Manual, issued by the Meteorological Office; any of which publications may be had of T. L. Ainsley, Mill Dam, South Shields.

J. W. SOFTLEY, EXTRA MASTER,  
HEAD INSTRUCTOR.

March, 1910.

*Meyer gift*

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**HEADS OF SEAMANSHIP EXAMINATIONS FOR ALL GRADES.**

The following list of subjects has been prepared in order to give some idea of the nature of the questions which have to be answered.

**SUBJECTS.**

- Measure blocks, rope, chain, canvas, etc.
- Parcel, serve, and fit rope.
- Make cringles, rattle rigging.
- Reeve tackles, cat fall, lanyards, etc.
- Take in, bend, and range cable.
- Carry out kedge and bower anchors.
- Clear hawse—Use of anchor and mooring buoys.
- Out longboat—To manage boat in surf and sea way.]
- Set and take in topgallant sails and courses.
- Man overboard, on a wind and free—Out and in reefs.
- Carrying away parrels, bobstays, braces, backstays, downhauls, etc.
- Steering gear carried away—Bowsprit sprung.
- Trestle trees coming down—Rigging slack.
- Tacking—Wearing—Changes of wind—Squalls, etc.
- Repairing sails; overall patch, and new cloth.
- Strip ship—Rig ship.
- Jibboom in and out.
- Yards and masts up and down—Ship and unship rudder.

**ADDITIONAL FOR MATES AND MASTERS.**

- Tending ship in a tide way.
- In and out lowermasts.
- Use of Log Book.
- Ship on her beam ends—In and out heavy weights.
- Boxhaul—Clubhaul.
- Get under way—Come to an anchor.
- Mooring and unmooring—Dragging on lee shore.
- Rig jury rudder—Construct a raft, etc.

Candidates for every grade over and above Second Mates will need to be well up in constructing purchases and other gear for getting in or out heavy weights, such as a shaft, a boiler, funnel, or mast, etc.

# INTERNATIONAL CODE OF SIGNALS.

The following pages are extracted from the International Code Book with a view to enable those persons who may not have the book at hand to acquaint themselves with the nature of its arrangements and contents.

The Code Book is divided into Two Parts. Part I., being confined to signalling with Flags; Part II., various methods of signalling with Semaphore, Hand Flags, and Morse Code.

## INSTRUCTIONS HOW TO SIGNAL.

In the following instructions the ship making the signal is called **A**; the ship signalled to is called **B**.

### *How to Make a Signal.*

1.—Ship **A** wishing to make a signal hoists her Ensign with the Code Flag under it.

2.—If more than one vessel or signal station is in sight, and the signal is intended for a particular vessel or signal station, ship **A** should indicate which vessel or signal station she is addressing, by making the distinguishing signal (*i.e.*, the signal letters) of the vessel or station with which she desires to communicate.

3.—If the distinguishing signal is not known, ship **A** should make use of one of the signals, DI to DQ. (See Code Book, page 11).

4.—When ship **A** has been answered by the vessel she is addressing, she proceeds with the signal which she desires to make, first hauling down her Code Flag if it is required for making the signal.

5.—Signals should always be hoisted where they can best be seen, and not necessarily at the masthead.

6.—Each hoist should be kept flying until ship **B** hoists her Answering Pennant "CLOSE UP."

7.—When ship **A** has finished signalling she hauls down her Ensign, and her Code Flag, if the latter has not already been hauled down.

8.—When it is required to make a signal it should be looked out in the General Vocabulary (see Code Book, page 64) which is the index to the Signal Book.

### *How to Answer a Signal.*

9.—Ship **B** on seeing the signal made by ship **A**, hoists her Answering Pennant at the "DIP."

A Flag is at the "DIP" when it is hoisted about  $\frac{2}{3}$  of the way up, that is, some little distance below where it would be when hoisted close up.

10.—When **A**'s hoist has been taken in, looked out in the Signal Book, and is understood, **B** hoists her Answering Pennant "CLOSE UP" and keeps it there until **A** hauls her hoist down.

11.—**B** then lowers her Answering Pennant to the "DIP" and waits for the next hoist.

12.—If the flags in **A**'s hoist cannot be made out, or if, when the flags are made out, the purport of the signal is not understood, **B** keeps her Answering Pennant at the "DIP," and hoists the signal OWL or WCX, or such other signal as may meet the case, and when **A** has repeated or rectified her signal, and **B** thoroughly understands it, **B** hoists her Answering Pennant "CLOSE UP."

#### *Notes on Signalling.*

1.—Ships passing one another or Signal Stations will do well to hoist the following signals in the order shown :—

- 1.—National Colours with the Code Signal under them.
- 2.—Ship's name (signal letters).
- 3.—Where from.
- 4.—Where bound.

The ensign should be dipped and re-hoisted as a farewell.

2.—It is the custom on board some ships to keep the flags of their distinguishing signal bent together. If this is done a toggle or some other mark should be used to prevent the flags being bent on and hoisted upside down.

3.—The following course is to be followed when making a signal which contains the ship's name and the owner's name and address. You may either use the Alphabetical Spelling Table or signal it letter by letter, the latter being preferable.

#### EXAMPLE.

Ship **A** wishes to get orders from her owner (say) Mr. Maccoy, at Mosley Street, Newcastle.

Having hoisted her National Colours with the Code Signal under them, she makes the following signals :—

- |                          |  |
|--------------------------|--|
| 1st hoist,               | Her distinguishing signal (signal letters).                              |
| 2nd hoist,               | SW = I wish to obtain orders from my owner,<br>Mr. —, at —.              |
| 3rd hoist,               | Code Flag over E = The signals which follow are<br>alphabetical.         |
| 4th hoist,<br>5th hoist, | MAC } = Maccoy.<br>COY }   |
| 6th hoist,               | Code Flag over F = End of the word (also means<br>dot between initials). |
| 7th hoist,<br>8th hoist, | MOS } = Mosley.<br>LEY }   |
| 9th hoist,               | Code Flag over G = The Alphabetical Signals are<br>ended.                |
| 10th hoist,              | WZN = Street.  |
| 11th hoist,              | AFL0 = Newcastle.  |

*Alphabetical (Spelling) Signals.*

Under the arrangement explained below, every flag hoisted after Alphabetical Signal No. 1 has been made, and until Alphabetical Signal No. 3, or Numeral Signal No. 1 (see page 7, Code Book) is made, represents the letter of the alphabet which has been allotted to it in the Code. If the word to be spelt consists of more than four letters, two or more hoists must be used, as no hoist is to contain more than four flags.

The following are the signals to be used :—

Code Flag over Flag E.

Alphabetical Signal No. 1, indicating that the flags hoisted after it until Alphabetical Signal No. 3, or Numeral Signal No. 1 is made, do not represent the signals in the Code, but are to be understood as having their alphabetical meanings and express individual letters of the alphabet which are to form words.

Code Flag over Flag F.

Alphabetical Signal No. 2, indicating the end of a word made by Alphabetical Signals, or dot between initials.

Code Flag over Flag G.

Alphabetical Signal No. 3, indicating that the Alphabetical Signals are ended; the signals which follow are to be looked out in the Code in the usual manner.

**EXAMPLE.**

To spell John Bailey.

1st hoist,      Code Flag over E = The signals which follow are alphabetical.

2nd hoist,      JOHN = John.

3rd hoist,      Code Flag over F = End of the word (also means dot between initials).

4th hoist,      BAI }  
5th hoist,      LEY } = Bailey.

6th hoist,      Code Flag over G = Alphabetical Signals are ended.

An alternative method of spelling words is provided by the Alphabetical Spelling Table.

*Numeral Signals.*

Under the arrangement shown below, every flag hoisted, after Numeral Signal No. 1 has been made, and until Numeral Signal No. 3 or Alphabetical Signal No. 1 (see page 6, Code Book) has been made, represents one or more figures, as indicated in the Numeral Table. (See Code Book, page 7.)

If the number to be signalled consists of more than four figures, two or more hoists must be used, as no hoist is to contain more than four flags; and if any figure occurs more than once in the same number, the figure must on its second occurrence begin or be in a second hoist, and on its third occurrence it must begin or be in a third hoist, unless use can be made of the signals K to Z in the Numeral Table.

The following are the signals to be used :—

Code Flag over Flag M.

Numerical Signal No. 1, indicating that the flags hoisted after it, until Numerical Signal No. 3 or Alphabetical Signal No. 1, is made, do not represent the signals in the Code, but express figures, as indicated in the Numerical Table, and have the special numerical values there given to them.

Code Flag over Flag N.

Numerical Signal No. 2, indicating the Decimal Point.

Code Flag over Flag O.

Numerical Signal No. 3, indicating that the Numerical Signals are ended; the signals which follow are to be looked out in the Code in the usual manner.

#### EXAMPLE.

To make 8.88976.

1st hoist,      Code Flag over M = The signals which follow are Numerical Signals, and are to be looked out in the Numerical Table.

2nd hoist,      H = 8  
 3rd hoist,      Code Flag over N = Decimal point  
 4th hoist,      RIGF = 88976 }  
 5th hoist,      Code Flag over O = The Numerical Signals are ended.

Signals for certain Decimals and Fractions will be found on page 32 of the Code Book.

#### EXAMPLE FROM NUMERAL TABLE (see Code Book, page 421).

To make 78000.

Code Flag under ZI	= 70,000
,,     ,,     YQ	= 8,000
78,000	

No Decimals or Fractions can be made from this table.

#### QUESTIONS RELATING TO CODE BOOK.

1.—How many Flags does the International Code of Signals consist of?

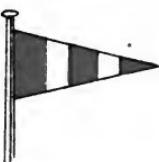
A.—Of Twenty-Six Flags, including Two Burgees and Five Pennants; but there is in addition a "Code Signal" or "Answering Pennant." (See Plate I.)

2.—What do these Flags represent?

A.—They represent the vowels and consonants of the Alphabet, and it is by a combination of One, Two, Three or Four of these Flags in a hoist that arbitrary signs are made, which represent words and sentences of the same significance in all languages.

# NEW INTERNATIONAL CODE FLAGS. PLATE I.

## "CODE FLAG" AND "ANSWERING PENNANT."



When used as the "Answering Pennant" it is to be hoisted at the mast-head or where best seen.

When used as the "Code Flag" it is to be hoisted under the Ensign.

A	G	L	Q	Y	
B	H	M	R	W	
C	I	N	S	X	
D					
E	J	O	T	Y	
F	K	P	U	Z	
C	D		B		
Assent—Yes.		Negative—No.		Powder Flag.	
L	P		S		
Cholera, Yellow Fever, or Plague Flag.		About to proceed to sea.		I require a Pilot.	



3.—Where are the Flags to be hoisted in signalling ?

A.—Any place where best seen.

4.—What is the object of the Code Pennant, and how is it used ?

A.—When hoisted under the Ensign it denotes a signal taken from the Code Book ; when hoisted by itself it is the Answering Pennant.

5.—About to signal with this Code, and having hoisted the Code Signal under the Ensign, what do you do next ?

A.—Wait for the signal from the other ship, and then hoist the signal I wish to make.

6.—How many kinds of **One-Flag** Signals are there ?

A.—One. The signal made between vessels towing and being towed and to be shown just above the gunwale.

7.—How many kinds of **Two-Flag** Signals are there ?

A.—There are two. Code Flag over One Flag, and Flags AB to ZY.

8.—How many kinds of **Three-Flag** Signals are there ?

A.—There are eight. Compass Signals, ABC to AST ; Money, ASU to AVJ ; Measures and Weights, AVK to BCN ; Decimals and Fractions, BCO to BDZ ; Auxiliary Phrases, BEA to CWT ; General Vocabulary, CXA to ZMR ; Latitude and Longitude, Divisions of Time, and Barometer and Thermometer, Code Flag over AB to ZY ; and Numeral Table, Code Flag under UA to ZY.

9.—How many kinds of **Four-Flag** Signals are there ?

A.—There are Four. Geographical Signals, ABCD to BFAU ; Alphabetical Spelling Table, CBDF to CZYX ; Names of Men-of-War ; and Names of Merchant Ships.

10.—Into how many parts is the Signal Book divided ;

A.—Two parts. Part I. containing Signals by Flags ; Part II. containing Distant, Semaphore, and Morse Code Signals.

11.—What does the hoist of Two Flags mean ?

A.—Attention, Urgent, or Important Signals.

EXAMPLES.—EC, What ship is that ? UE, Report me by telegraph to owners.

12.—What does the Code Flag over E mean ?

A.—That the Signals will be made Alphabetically.

13.—What does the Code Flag over M mean ?

A.—That Numeral Signals are going to be made.

14.—How do you make a Compass Signal ?

A.—With three Flags, Burgee A on top.

EXAMPLES IN POINTS.—ARE, S.E.  $\frac{1}{2}$  S. ; ART, S.W.  $\frac{1}{2}$  S.

EXAMPLES IN DEGREES.—AML, N.  $86^{\circ}$  W. ; AIU, S.  $6^{\circ}$  W.

EXAMPLES IN MONEY.—AUI, Milreis ; AVB, Shilling ; ATN, Ten Dollars.

EXAMPLE IN MEASURES OF LENGTH.—AWO, Mile, Geographical or Nautical, or Knot.

EXAMPLE IN MEASURES OF CAPACITY.—AYP, Bushel.

EXAMPLES IN DECIMALS AND FRACTIONS.—BCT, .05, or  $\frac{5}{100}$ , or  $\frac{1}{20}$ ; BDG,  $\frac{3}{5}$ , or .6; BDR,  $\frac{9}{16}$ .

EXAMPLES IN AUXILIARY PHRASES.—BFW, Having been; BNR, It ought to have been done; CDG, If you were; CJE, Shall, or Will you not.

#### *General Vocabulary.*

15.—State how the given Hoists, or Signal Letters, are arranged in the General Vocabulary.

A.—Commencing from where the Auxiliary Phrases end, the Three Flag Signals are still arranged in Alphabetical order, from CXA to ZMR.

16.—Describe how you will ascertain what Signal to hoist for any purpose.

A.—First look for the Initial Letter of the *principal* word, and the Signal will be found in the columns. Many hoists have two principal words. The Two-Flag Signals are also in the General Vocabulary.

Thus, for example, if it be required to Signal to a ship to leeward that a squall is coming, look up the word "Squall," Initial Letter S (see Code Book, page 351). Under the word "Squall" we shall find—

Severe squall not far off; look sharp, FZ.

Again, if we wished to enquire of a vessel what was the Latitude, take the initial letter L for Latitude, page 233, and under this we have

What is your Latitude brought up to the present moment? QIB.

17.—To interpret a signal; that is, given the Flags to find the nature of the hoist.

A.—Open the book and look carefully down the indiced edge for the first Flag of the hoist, and the signal will be found close to.

---

The following are given as a few illustrations of the Signals the Candidate will be required to make. The Signal Letters are added for the convenience of learners.

1.—What ship is that? EC.

NOTE. The principal word ship is sought for, Initial Letter S; or, see Attention and Demand Signals.

2.—Man overboard. BR.

3.—My chronometer has run down. GQ. (See Plate II.)

4.—Steering to the \_\_\_\_\_. WUG. South-east. ARD. (See Plate II.).

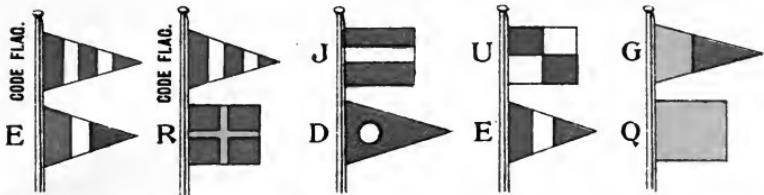
5.—W. by N.  $\frac{1}{2}$  N. ASG.

6.—Code Flag over JN  $154^{\circ}$ . Code Flag over NM  $47'$ . Code Flag over OW  $20''$ .  $= 154^{\circ} 47' 20''$ .

7.—Code Flag over YI  $80^{\circ}$  Fahrenheit, or  $+ 26^{\circ} 7$  Centigrade, or  $+ 21^{\circ} 3$  Reaumur.

# EXAMPLES.

PLATE II.



Alphabetical  
Signal, No. 1.

Do not pass  
ahead of me.

You are standing  
into danger.

Report me by  
telegraph to Owners.

My Chronometer  
has run down.

Auxiliary Phrase.		General Vocabulary.		Degrees, Latitude and Longitude.	
	N		Q		Q
E	B		Z		
Z	L		K		
You are not		What is your first Meridian?	My first Meridian is Greenwich.	What is your Longitude brought up to the present moment?	9° East Longitude.

General Vocabulary.		Degrees, Latitude and Longitude.		General Vocabulary.		Compass Signal.	Numerical.
			W		A		Y
I		H			R		S
B		X		G			D
What is your Latitude brought up to the present moment?		51°	North Latitude.	Steering to the	S.E.	10,000.	

Alphabetical Spelling Table.		Geographical Signal.		Merchant Vessel.		Man-o'-War.	
				Resolution, S., of Whitby, Official No. 89788.		H.M.S. Rodney.	
G.O.O. Cooper.		P.E.R.	London.				



# SIGNALS MADE BY ONE FLAG

To be used only between vessels towing and being towed.

**The Flag is to be held in the hand, and only to be shown just above the Gunwale.**

SIGNALS ABOUT	FLAG.	MEANING WHEN MADE BY THE SHIP TOWED	BY THE SHIP TOWING.
Cables, or, Hawser.	A — Is the towing cable ( <i>or, hawser</i> ) fast? B — The towing cable ( <i>or, hawser</i> ) is fast. C — The towing cable ( <i>or, hawser</i> ) is not fast. D — Equalise the strain on the cables ( <i>or, hawsers</i> ). E — Cannot slack more cable ( <i>or, hawser</i> ). F — Shorten in the port cable ( <i>or, hawser</i> ). G — Shorten in the starboard cable ( <i>or, hawser</i> ). H — Shorten in both cables ( <i>or, hawsers</i> ). I — Veer the port cable ( <i>or, hawser</i> ). J — Veer the starboard cable ( <i>or, hawser</i> ). K — Veer both cables ( <i>or, hawsers</i> ). L — Cast off the port hawser. M — Cast off the starboard hawser. N — Cast off both hawsers.	Is the towing cable ( <i>or, hawser</i> ) fast? The towing cable ( <i>or, hawser</i> ) is fast. The towing cable ( <i>or, hawser</i> ) is not fast. Equalise the strain on the cables ( <i>or, hawsers</i> ). Cannot slack more cable ( <i>or, hawser</i> ). Shorten in the port cable ( <i>or, hawser</i> ). Shorten in the starboard cable ( <i>or, hawser</i> ). Shorten in both cables ( <i>or, hawsers</i> ). Veer the port cable ( <i>or, hawser</i> ). Veer the starboard cable ( <i>or, hawser</i> ). Veer both cables ( <i>or, hawsers</i> ). Cast off the port hawser. Cast off the starboard hawser. Cast off both hawsers.	
Speed.	O — Go as slow as possible. P — Go easy. Q — Go half speed. R — Go full speed. S — Stop the engines.	Am going as slow as possible. Am going easy. Am going half speed. Am going full speed. Must stop.	
Steering.	T — Steer more to port. U — Steer more to starboard. V — Steady as you go. W — Steer six points from the wind.	Steer more to port. Steer more to starboard. Steady as you go. Ship will not steer properly.	
Sail.	X — Make sail. Y — Set fore and aft sails.	Make sail. Set fore and aft sails.	
<b>Special Z</b>	— Man overboard.	Man overboard.	

## SIGNALS BY NIGHT.

To be used only between ships towing and being towed, and to be made by short flashes of light.

Steer more to port — — |

Steer more to starboard —

Cast off hawsers — — — —

# URGENT AND IMPORTANT SIGNALS.

## TWO-FLAG SIGNALS.

### CODE FLAG OVER ONE FLAG.

SIGNAL.	MEANING.
<b>CODE FLAG over A</b>	—I am on full speed trial.
," " " <b>B</b>	—I am taking in ( <i>or</i> , discharging) gunpowder or other explosive.
," " " <b>C</b>	—Yes, <i>or</i> , Affirmative.
," " " <b>D</b>	—No, <i>or</i> , Negative.
," " " <b>E</b>	—Alphabetical Signal No. 1.*
," " " <b>F</b>	—Alphabetical Signal No. 2.*
," " " <b>G</b>	—Alphabetical Signal No. 3.*
," " " <b>H</b>	—Stop, Heave-to, <i>or</i> , Come nearer; I have something important to communicate.
," " " <b>I</b>	—I have not a clean bill of health.
," " " <b>J</b>	—I have head-way.
," " " <b>K</b>	—I have stern-way.
," " " <b>L</b>	—I have ( <i>or</i> , have had) some dangerous infectious disease on board.
," " " <b>M</b>	—Numeral Signal No. 1.†
," " " <b>N</b>	—Numeral Signal No. 2.†
," " " <b>O</b>	—Numeral Signal No. 3.†
," " " <b>P</b>	—I am about to sail.
," " " <b>Q</b>	—I have a clean bill of health, but am liable to quarantine.
," " " <b>R</b>	—Do not pass ahead of me.
," " " <b>S</b>	—I want a pilot.
," " " <b>T</b>	—Do not overtake me.
," " " <b>U</b>	—My engines are stopped.
," " " <b>V</b>	—My engines are going astern.
," " " <b>W</b>	—All boats are to return to the ship.
," " " <b>X</b>	—I will pass ahead of you.
," " " <b>Y</b>	—All ships of the convoy are to rejoin company.
," " " <b>Z</b>	—I will pass astern of you.

\* For instructions as to the use of these Signals, see page 5.

† For instructions as to the use of these Signals, see page 6.

8.—Code Flag under YO 6,000.

9.—Suppose you wish to signal London?

Turn to Geographical Signals arranged Alphabetically and look for London. Having found it, the Signal Letters AEHV will be seen to the right, thus—

London AEHV.

NOTE.—London can also be found Geographically, as all countries appear in their proper order.

*The Alphabetical Spelling Table.\**

The Pennant C is common to all Signals in the Alphabetical Spelling Table.

To spell the word Thomas, as an example, turn to the Alphabetical Spelling Table and look for the letter T; having found it, look carefully down the column, seeking for as many letters of the word Thomas as can be found. The first three letters, viz., Tho, can be found, and abreast of them are the Signal Letters CVZX.

The next letter is M, which being found, look carefully down for as many of the remaining letters of the word as can be found, and the letters Mas will be found, and abreast of these will be seen the Signal Letters CPSD.

Tho	CVZX	}	Thomas, in Two Hoists.
Mas	CPSD		

**EXAMPLES ILLUSTRATING THE USE OF THE FLAGS.**

Z Man overboard. Special Signal. Code Flag over S I want a pilot.

N Cast off both hawsers. | Code Flag over W All boats are to return to the ship.

*Urgent and Important Signals.*

NS In distress; want assistance. | PR Have you fallen in with ice?

*Burgee A is common to Compass Signals.*

AQZ S.E. by E.  $\frac{1}{2}$  E. | ABO N.  $12^{\circ}$  E.

*Auxiliary Phrases.*

CRV	When shall (or will) I (they, we, or, you) do?		CTD Where he (she, it, or person-s or thing-s indicated) is (or are).
-----	--	--	---

*General Vocabulary.*

ISL	Clause.	MWK	I have had cases of yellow fever on board.
IPT	Port suspected of cholera, etc	NIK	Fresh gale. (NIK is also force of wind 8).
KOA	What day do you leave?	PBU	Ice as far as I can see.
ETQ	Meteorological Office reports gale approaching from the,	QHX	North Latitude.
PWX	End of June.	QHZ	South Latitude.
MKJ	Your papers will be examined	QYZ	East Longitude.
PCH	You will fall in with ice if you go beyond —.	QZI	West Longitude.

\* The Candidate should be practised in the use of the Spelling Table by being required to spell his own name, or some other word.

*Code Flag over Two Flags.*

Code Flag over		Code Flag over	
AB	Latitude.	OH	6 seconds.
AN	11° Lat.	RS	28·98 inches, 736· milli-metres.
GP	81° Long.		
KW	6 hours (or 6 P.M.)	VM	30° 2 Fahr., — 1° Cent., — 0° 8 Reau.
MI	18 minutes.		

*Code Flag under Two Flags.*

Code Flag under		Code Flag under	
VA	25	YT	11,000

*Burgees A and B are common to all Geographical Signals.*

ABYI Christiania. | AEQW Cardiff.

ADTZ Oste Reef (Oste Riff) Lt. V. | AFLM Shields, South

*The Pennant C over Three Flags indicates Alphabetical Spelling Table.*

OSWN Phi. | CDBF Ann. | CVNL Sla.

## DISTANT SIGNALS.

Part II of the Signal Book is composed of Distant Signals and Morse Code Signals.

Three different methods of making Distant Signals are given.

- (1) By Cones, Balls, and Drums.
- (2) By Balls, Square Flags, Pennants, and Whefts.
- (3) By the Fixed Coast Semaphore.

Semaphore Signals are not necessarily Distant Signals, as they can be used at close quarters.

The Characteristic of Distant Signals is the Ball; one Ball at least appearing in each hoist of the Distant Code. In the case of the Semaphore the Ball is replaced by a Disc.

Distant Signals are made by hoisting shapes, or by the position of the arms of a Semaphore.

The Shapes used as symbols are—

- |                                |          |
|--------------------------------|----------|
| (1) A cone point upwards means | <b>1</b> |
| A Ball                         | <b>2</b> |
| A Cone point downwards , ,     | <b>3</b> |
| A Drum , ,                     | <b>4</b> |

The Drum should be at least one-third greater in height than the Ball.

- (2) A square Flag may be substituted for the cone point upwards.  
A Ball,
- A Pennant may be substituted for the cone point downwards, and  
A Pennant with the fly tied to the halyards, or a Wheft for the drum.
- (3) In signalling by the Semaphore, the positions of the arms represent the shapes. (See Plates 1 and 2).

PLATE I.

GENERAL ALPHABETICAL TABLE FOR MAKING THE INTERNATIONAL CODE SIGNALS BY MEANS OF DISTANT SIGNALS BY FIXED SEMAPHORE.

<u>"Preparative" "Answering"</u> "Stop" after each complete signal			
			<u>Annul the whole Signal</u> 
A 1.1.2		I 2.1.2	
Q 2.3.3		Y 3.2.3.	
B 1.2.1		J 2.1.3	
R 2.3.4.		Z 3.2.4.	
C 1.2.2		K 2.1.4.	
S 2.4.1.		SPECIAL	
D 1.2.3		L 2.2.1.	
T 2.4.2.		Code Flag Sign. 4.2.1.	
E 1.2.4		M 2.2.3	
U 2.4.3		Alphabetical Sign. 4.2.2.	
F 1.3.2.		N 2.2.4.	
V 3.1.2		Numerical Sign. 4.2.3.	
G 1.4.2.		O 2.3.1.	
W 3.2.1		4.3.2.	
H 2.1.1.		P 2.3.2	
X 3.2.2		Finishing sign after completion of word or number, when spelling or making numerical signals.	

PLATE 2.

GENERAL ALPHABETICAL TABLE FOR MAKING THE INTERNATIONAL CODE SIGNALS BY MEANS OF DISTANT SIGNALS BY SHAPES.

<u>Preparative "Answering"</u> <i>Stop after each complete signal</i>			<u>Annul the whole Signal</u>
A 1 1 2	I 2 1 2	Q 2 3 3	Y 3 2 3
B 1 2 1	J 2 1 3	R 2 3 4	Z 3 2 4
C 1 2 2	K 2 1 4	S 2 4 1	SPECIAL SIGNS
D 1 2 3	L 2 2 1	T 2 4 2	Code Flag Sign 4 2 1
E 1 2 4	M 2 2 3	U 2 4 3	Alphabetical Sign 4 2 2
F 1 3 2	N 2 2 4	V 3 1 2	Numeral Sign 4 2 3
G 1 4 2	O 2 3 1	W 3 2 1	Finishing Sign after Completion of word or number, when 4 3 2 or making numerical signals
H 2 1 1	P 2 3 2	X 3 2 2	

If no Cones are available, a square Flag may be substituted for the Cone point upwards, a Pennant for the Cone point downwards, and a wheel for the Drum.

To simplify the "Taking in," "Reporting," and "Reading off" of the Distant Signals, the positions of the Semaphore Arms, and the four Symbols have been numbered 1, 2, 3, 4. (See Plates 1 and 2).

To facilitate signalling by Semaphore or Shapes, the signals representing the letters of the alphabet have been arranged in numerical order, the figures representing the signals for the letter A being the first in numerical sequence.

Thus A is represented by **1 1 2**

B            "",            **1 2 1**

C            "",            **1 2 2**

etc., etc.

The signals representing the letters from A to G commence with **1**. Those from H to U begin with **2**; those from V to Z begin with **3**; and the Special Signs (*i.e.*, Code Flag, Alphabetical, Numeral, and Finishing Signs) begin with **4**. (See Plates 1 and 2).

When Signals are made by the Semaphore, the disc is always to be kept up until the signal is completed, and the hoist is to be read from the top arm downwards.

The Code Flag Sign **4 2 1** is always to be shown before signals taken from the General Vocabulary of the International Code are commenced.

Examples of Signals from the International Code made by fixed Semaphore or by Distant Signals:—

**4 2 1** Code Flag Sign. **1 2 3** D. **2 2 4** N. **2 1 2** I. **2** Stop.

Looking DNI out in the International Code, we find it to be "Pilot boat is advancing towards you."

The different positions of the Semaphore and Shapes each represent a letter of the alphabet, and two or more positions on the Semaphore or Shapes will give some signal in the Code Book.

**2 4 3** U **1 2 4** E **1 1 2** A      UEA.—Are you in quarantine?

**1 1 2** A **1 2 1** B      AB.—Abandon the vessel as fast as possible.

#### *Alphabetical Distant Signals.*

When it is desired to spell a word by Distant Signals, the Alphabetical Sign **4 2 2** is to be shown first. All the hoists which follow until the Finishing Sign **4 3 2** is shown are understood as representing the particular letters of the alphabet allotted to them, which, when combined, spell the word which it is desired to signal. (See Plates 1 & 2).

EXAMPLE.—To spell Jones.

Alphabetical Sign **4 2 2**.

<b>2 1 3</b>	J
<b>2 3 1</b>	O
<b>2 2 4</b>	N
<b>1 2 4</b>	E
<b>2 4 1</b>	S

} Jones.

NOTE.—This method of Signalling is on the same principle as the Code Flag over E, F, and G. (See page 5.)

**4 3 2** Finishing Sign after completion of word, or number.

*Numerical Distant Signals.*

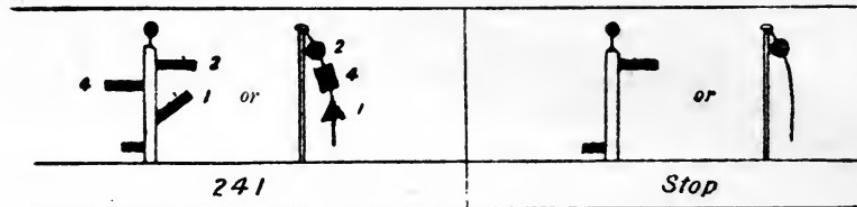
When it is desired to signal numbers by Distant Signals, the Numeral Sign **423** is to be shown first. After that sign has been shown, and until the Finishing Sign **432** is shown, the hoists representing the various letters of the alphabet are to be understood as having the numerical values which are allotted to the particular letters under the system of making Numeral Signals by flags. (See Plates 1 and 2).

*Special Distant Signals, arranged Numerically.*

As signals from the General Vocabulary of the International Code require to be made by more than one hoist, which involves loss of time, arrangements have, however, been adopted by which thirty-seven important signals can be made by one hoist only. There are thirty-seven signals called "Special Distant Signals," and are represented by numbers, as explained on page 9, and not by letters.

The Special Distant Signals are distinguished from Distant Signals taken from the General Vocabulary of the International Code by the fact (1) that they are not preceded by the Code Flag Sign, and (2) that the Stop Signal immediately follows the single hoist representing the particular "Special Distant Signal" which is being made.

Examples of "Special Distant Signals" made by a single hoist followed by the Stop signal.



NOTE.—These Signals may be made by the Semaphore, by Cones, Balls, and Drums, or by Square Flags, Balls, Pennants, and Whefts.

**2** "Preparative," "Answering," or, "Stop," after each complete signal.

**12** Aground; want assistance.

**112** I am on fire.

**214** Ship disabled; will you assist me into port.

*Special Distant Signals, arranged Alphabetically.*

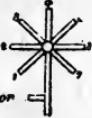
Examples of "Special Distant Signals" made by a single signal followed by the Stop signal.

**213** Bar, or, Entrance is dangerous.

**212** You are running into danger.

## PLATE 3.

## THE BRITISH MOVABLE SEMAPHORE.

SEMAPHORE SIGNS.		GOVERNING SIGNS.			
		 <small>Preparatory When closed it denotes the finish.</small>			
<i>Signs</i>			<i>Alphabetical</i>	<i>Numerical</i>	<i>Aural or Negative</i>
<i>Alphabetical Signification</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
<i>Numerical Signification</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Signs</i>				<i>F</i>	<i>G</i>
<i>Alphabetical Signification</i>	<i>H</i>	<i>I</i>		<i>J</i>	<i>K</i>
<i>Numerical Signification</i>				<i>L</i>	<i>M</i>
<i>Signs</i>				<i>N</i>	<i>O</i>
<i>Alphabetical Signification</i>			<i>P</i>	<i>Q</i>	<i>R</i>
<i>Numerical Signification</i>		<i>O</i>			
<i>Signs</i>					
<i>Alphabetical Signification</i>	<i>S</i>	<i>T</i>	<i>U</i>	<i>V</i>	<i>W</i>
					<i>X</i>
					<i>Y</i>
					<i>Z</i>
<p><i>Note. If a numeral signal is to be followed by words, the end of the numerical signification of the signs, is shown by the Alphabetical sign being made, indicating that spelling is again to commence.</i></p>					

## The Indicator.

The Indicator denotes from which side the signs are to be read, but when first shown it is to call attention, and may be considered the preparative signal. When closed it denotes the finish of the communication,

## PLATE 4.

BRITISH METHOD OF SEMAPHORING BY HAND FLAGS.						
SIGNS						
Alphabetical Signification	A	B	C	D	E	F
Numerical Signification	1	2	3	4	5	6
SIGNS						
Alphabetical Signification	G	H	I	J	K	L
Numerical Signification	7	8	9	ALSO ALPHABETICAL SIGN.		0
SIGNS						
Alphabetical Signification	M	N	O	P	Q	R
SIGNS						
Alphabetical Signification	S	T	U	V	W	X
SIGNS						
Signification	Y	Z		ALPHABETICAL.	NUMERAL.	ANNUL.

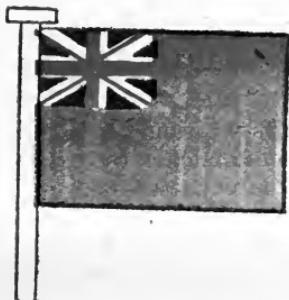
*Semaphoring by Hand Flags.*

The British method of Semaphoring by flags held in the hand which is shown in Plate 4, is exactly the same as the British Moveable Semaphore System, as shown in Plate 3, the positions of the apparatus which denotes the letters, numbers, and special signs being, it will be seen, identical in each case, and the only difference being in the apparatus employed.

## BRITISH SIGNAL MANUAL.

The object of the Manual is to explain the means of signal communication between British Men-of War and British Merchant Vessels, both by day and night.

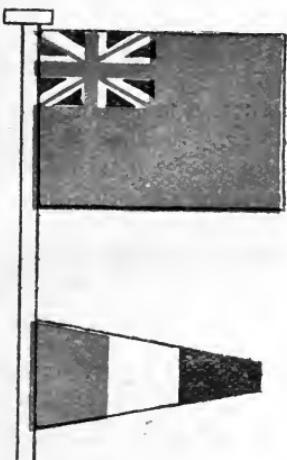
### FLAGS WITH SPECIAL SIGNIFICATIONS.



**RED ENSIGN.**—Hoisted by a British man-of-war, indicates that she wishes to communicate with a British merchant vessel; or that she is receiving a signal which is being made by a British merchant vessel.

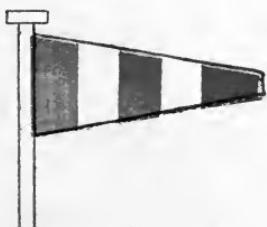
The Red Ensign, when used by a British man-of-war for the purpose prescribed in the fore-going, is to be hoisted in that position where it can be best seen by the merchant vessel.

A man-of-war when receiving a signal will, in addition to the above, answer the signal in the usual way with the Code flag.



**RED ENSIGN OVER E FLAG.**—Hoisted by a British man-of-war, in such a position where it can be best seen, indicates that she wishes, or is willing, to exercise signals with a British merchant vessel; or that she is receiving an exercise which is being made by a British merchant vessel.

A man-of-war when receiving an exercise will, in addition to the above, answer in the usual way with the Code flag.

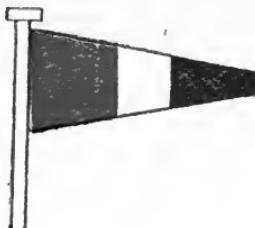


**CODE FLAG**—Hoisted over one of the flags of the Code, refers to the table of “Urgent and Important” Signals.

Hoisted over or under two flags of the Code, refers to one of the tables—Latitude and Longitude, Time, Barometer and Thermometer, Numeral, etc.—in the International Code Signal Book.

Hoisted by itself, it is the Answering Pennant for flag or semaphore signals.

Hoisted singly, by a ship making a flag signal, it indicates that the signal is finished.



**E FLAG.**—Hoisted singly by a British merchant vessel, in such a position where it can be best seen, indicates that she wishes or is willing, to exercise signals with a British man-of-war, or with another British merchant vessel; to be hauled down when the exercise commences.

---

**J FLAG.**—Hoisted by a man-of-war in any position inferior to the Red Ensign, indicates that she wishes to communicate by semaphore with a British merchant vessel.



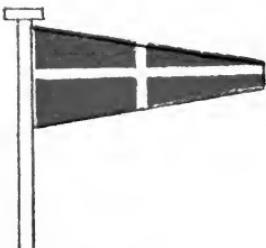
Hoisted by a man-of-war, in any position inferior to the **E** flag\* under the Red Ensign, it indicates that the exercise will be made by semaphore.

Hoisted singly by a British merchant vessel it indicates that she wishes to communicate by semaphore with a British man-of-war or with another British merchant vessel.

Hoisted by a British merchant vessel in any position inferior to the **E** flag, it indicates that the exercise will be made by semaphore.

\**Note.*—For this purpose, the **J** flag must be well separated from **E** in order to prevent the two flags being mistaken for signal **E J**.

---



**F FLAG.**—Flown at the yard-arm of a British man-of-war, indicates that she is the ship having the guard.

*Note.*—This is the ship which should be sent to if information or assistance (other than medical) is required.



**M Flag.**—Flown at the yard-arm of a British man-of-war, it indicates that she is the ship having the Medical Guard.

*Note.*—There is always a doctor on board the man-of-war flying this flag.

YEAR 1910.

*Leaflet for insertion in British Signal Manual.*

## **Signalling between certain Signal Stations in the British Isles and Merchant Vessels.**

---

Lloyd's Stations will remain the channel through which merchant vessels transmit and receive commercial intelligence.

In order to give the mercantile marine further opportunities of practising the system of signalling laid down in the British Signal Manual, Lloyd's Stations, and His Majesty's Signal Stations, will receive and answer communications from passing merchant vessels of the nature indicated in the Manual.

A British merchant vessel wishing to communicate by day with one of His Majesty's Signal Stations should hoist the letter "Z"; by night she should communicate as laid down on page 26 of this book.

*The Code Flag hoisted under the White Ensign or Lloyd's Ensign at one of His Majesty's Signal Stations or Lloyd's Stations indicates that the station wishes to communicate with a British merchant vessel or is receiving a signal which is being made by a British merchant vessel, when using either the British Signal Manual or the International Code.*

A British merchant vessel wishing to exercise flag signals with one or His Majesty's Signal Stations will hoist "E" flag (International) where best seen. If the vessel wishes to exercise signals by semaphore she will hoist "J" flag (International) in addition, well clear of the "E" flag. The signal station, if willing to exercise, will answer by hoisting "E" flag (International) under the White Ensign where best seen. The "E" flag will be hauled down when the exercise commences, and the rehoisting of the "E" flag by either the vessel or the station will signify "Signal Exercise finished." The code flag will be worked as laid down on page 15 of this book.

A shore station will not communicate with a merchant vessel by semaphore unless the vessel has previously addressed the station by semaphore.

All movements of men-of-war sighted at sea should be communicated, specially noting—

1. *Name of ship reporting.*
2. Number of men-of-war sighted.
3. Nature of men-of-war sighted and nationality, if ascertained.
4. Time and date of men-of-war sighted.
5. Direction in which men-of-war were steaming.
6. Speed at which men-of-war were steaming, if ascertained.
7. Point of land off which, or the latitude and longitude in which men-of-war were sighted.

The special code in the British Signal Manual should be used for this purpose.

The code flag will always be hoisted superior to any three-letter hoist taken from the British Signal Manual to indicate that the hoist is to be looked out from that book and *not* from the International Signal Book.

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*Errata to British Signal Manual as given on pages 13 to 15 in this book.*

*Page 13.* Signification of Code Flag.

Add new paragraph 3.

“Hoisted over three letters of the Code indicates that the signal is contained in the British Signal Manual.”

Add new paragraph 4.

“Hoisted under the White Ensign or Lloyd’s Ensign by a signal station indicates that the signal station wishes to communicate with, or is receiving a signal from, a British merchant vessel using the British Signal Manual or International Code.”

Present paragraphs 3 and 4 to be renumbered 5 and 6.

*Pages 14 and 15.* Signification of “E” flag.

Cancel and substitute—

“Hoisted singly by a British merchant vessel, in such a position where it can be best seen, indicates that she wishes, or is willing, to exercise signals with a British man-of-war, or with another British merchant vessel, or with certain of His Majesty’s Signal Stations.”

“The signal station, if willing to exercise, will answer by hoisting “E” flag under the White Ensign.”

“The “E” flag is to be hauled down when the exercise commences.”

“The rehoisting of the “E” flag singly by the vessel or station during signal exercise will denote ‘Signal Exercise finished.’”

*Page 14.* Signification of “J” flag.

Add new paragraph.

“Hoisted by one of His Majesty’s Signal Stations indicates that the station wishes to communicate by semaphore with a British merchant vessel.”

*Page 14.* Signification of “J” flag.

Add to paragraph 3.

“Or with one of His Majesty’s Signal Stations.”

*Page 14.* Add “Z” flag with signification.

“Hoisted by a British merchant vessel indicates that she wishes to communicate with one of His Majesty’s Signal Stations.”

*Page 15.* Add—

“Signalling and exercise between British merchant vessels and His Majesty’s Signal Stations.”

## INSTRUCTIONS.

*Flag Signalling between His Majesty's Ships and British Merchant Vessels.*

Should one of His Majesty's ships wish to communicate with a British merchant vessel, she will hoist a Red Ensign in such a position where it can be best seen, and the first hoist of the signal which she desires to make in an inferior position.

The Red Ensign to be kept flying while the signal is being made, and hauled down on its completion.

A British merchant vessel wishing to communicate with one of His Majesty's ships need only hoist the signal which she desires to make.

This applies also when two or more men-of-war are in company, as in such a case the senior officer's ship, or the ship detailed by the senior officer, only will answer.

But if there be more than one vessel within signalling distance, or if a merchant vessel wishes to address any particular ship of a fleet, the distinguishing signal (signal letters) of the ship with which it is desired to communicate, or one of the signals **D I** to **D R** from the International Code Signal Book may be hoisted.

*To Answer Signals.*

Signals should be answered by hoisting the Answering pennant (Code Flag) at the dip when signal is seen, and close up when each hoist is understood, lowering it to the dip as each hoist is hauled down.

In addition to this, a man-of-war will hoist the Red Ensign where best seen, when answering a merchant vessel.

*Finishing a Signal.*

A ship making a signal by flags should hoist the Code Flag singly, after the last hoist of the signal, to indicate that the signal is finished; this will be answered by the ship receiving the signal in the same way as any other hoist.

*To Exercise Flag Signals.*

A man-of-war wishing to exercise signals with a British merchant vessel will hoist **E** flag under the Red Ensign (to be kept close up while making the exercise and hauled down on its completion). The merchant vessel, willing to exercise, will answer by hoisting **E** flag singly, which flag may be hauled down when the exercise commences.

A merchant vessel wishing to exercise signals with a man-of-war will hoist **E** flag, which may be hauled down when the exercise commences. The man-of-war, willing to exercise, answers by hoisting **E** flag under the Red Ensign, to be kept flying until the exercise is finished.

A merchant vessel wishing to exercise signals with another merchant vessel will hoist **E** flag, to be hauled down when answered. The vessel addressed, willing to exercise, will answer this by hoisting **E** flag, to be hauled down when the exercise commences.

If it is not desired to exercise, the signal **U S X**—“Sorry I am unable to comply with your request” should be made.

## EXAMPLES OF FLAG SIGNALLING.

## EXAMPLE I.

The steamer *Spheroid*, on returning from a voyage, makes the Old Head of Kinsale and reports herself by hoisting the flags representing her signal letters (**M K V N**), which the signal station on the Old Head of Kinsale should answer by hoisting the Code Flag (Answering Pennant) at the dip when signal is seen, and close up when understood.

## REPLY.

The Old Head of Kinsale has received orders from the owners of the ss. *Spheroid* that she is to discharge her cargo at Antwerp. Proceeds as follows:—

<b>Old Head of Kinsale</b> (Signalling)	<b>ss. "Spheroid"</b> (Receiving)
Hoists—	
1st hoist { <b>S</b> { Have received orders for you to discharge cargo at	Answers by hoisting the Code flag (Answering pennant), at the dip when signal is seen, and close up when each hoist is understood, lowering it to the dip as each hoist is hauled down.
2nd hoist { <b>A</b> { Antwerp <b>E</b> <b>G</b> <b>S</b>	Answers by hoisting the An- swering pennant (Code flag) close up.
Hoists the Code Flag to indicate that signal is finished, and hauls it down when answered.	

## Explanation of the Pilot Jack Table.

This table is for indicating, in one hoist, the nationality, number, and class of vessels-of-war sighted, as well as the approximate direction in which they were steering.

It is compiled on the assumption that all British ocean-going merchant vessels are supplied with the Pilot Jack in addition to the flags of the International Code.

The Pennant shaped flags **C**, **D**, **E**, **F**, **G**, and Code flag (either singly or in pairs), represent nationality.

The flags **B**, **H**, **O**, **R**, **T**, **U**, **V**, **W**, **Y**, and **Z**, in all of which the colour red appears (either singly or in pairs), represent numbers.

The flags **A**, **I**, **J**, **K**, **L**, **M**, **N**, **P**, **Q**, **S**, and **X**, in which the colour red does not appear, represent the various classes of men-of-war.

The Pilot Jack indicates that this table is being used, and according to its position as 1st, 2nd, 3rd, or 4th flag of the hoist, it indicates the direction to northward, southward, eastward, or westward, in which the men-of-war were steering when sighted.

**PILOT JACK TABLE**  
FOR REPORTING VESSELS OF WAR SIGHTED

CODE FLAG		UNKNOWN	B		I	A		LARGE FLEET
C		JAPANESE	H		2	I		SMALL FLEET
D		RUSSIAN	O		3	J		BATTLESHIPS
E		FRENCH	R		4	K		LARGE CRUISER
F		BRITISH	T		5	L		SMALL CRUISER
G		GERMAN	U		6	M		ARMED MERCHANT VESSELS
C		AMERICAN	V		7	N		SUBMARINES
D		ITALIAN	W		8	P		TORPEDO BOAT DESTROYERS OR TORPEDO BOAT
E		AUSTRIAN	Y		9	Q		TRANSPORTS WITH TROOPS
C		AUSTRIAN	Z		10 or O	S		FLEET AUXILIARIES HOSPITAL SHIPS STORESHIPS &c
F					PILOT JACK	X		COLLIERS



If it is the first flag of a hoist, it indicates that vessels sighted were steering to the northward.

If it is the second flag of a hoist, it indicates that vessels sighted were steering to the southward.

If it is the third flag of a hoist, it indicates that vessels sighted were steering to the eastward.

If it is the fourth flag of a hoist, it indicates that vessels sighted were steering to the westward.

If it is necessary to use two pennants to represent the nationality, or two flags to represent the number of vessels sighted, the two must be considered as one, with relation to the position of the Pilot Jack in the hoist, for indicating the direction in which vessels were steering when sighted.

Should it be desired to make the date, time, latitude and longitude, or position, etc., when vessels were sighted, the hoist must be selected in the usual way from the International Code Signal Book, and made after the hoist (or hoists) from this table.

#### **Pennants for indicating those Nationalities not included in the Plate.**

Pennant-shaped  
Flags.

<b>CG</b>	Argentine
<b>DC</b>	Belgian
<b>DE</b>	Brazilian
<b>DF</b>	Bulgarian
<b>DG</b>	Chilian
<b>EC</b>	Chinese

Pennant-shaped  
Flags.

<b>ED</b>	Columbian
<b>EF</b>	Danish
<b>EG</b>	Dutch
<b>FC</b>	Mexican
<b>FD</b>	Peruvian
<b>FE</b>	Portuguese.

Pennant-shaped  
Flags.

<b>FG</b>	Siamese
<b>GC</b>	Spanish
<b>GD</b>	Turkish
<b>GE</b>	Uruguayan
<b>GF</b>	Venezuelan

#### *Examples of Signalling by the Pilot Jack Table.*

##### **EXAMPLE I.**

A merchant vessel wishing to report that she has sighted a British cruiser steering to the northward, should hoist :—

{ Pilot Jack <b>F</b> <b>B</b> <b>K</b>	Sighted vessels-of-war steering to the northward
	British
	I
	Large cruiser.

##### **EXAMPLE II.**

To report "Sighted small fleet, nationality unknown, steering to the westward":—

1st hoist	{ Code flag <b>B</b> Pilot Jack	Unknown nationality
		I
		Small fleet
Sighted vessels-of-war steering to the westward.		

## INSTRUCTIONS FOR THE USE OF THE SEMAPHORE.

Should one of His Majesty's ships wish to communicate by semaphore with a British merchant vessel, she will hoist the Red Ensign where best seen, and **J** flag in any position inferior to it, keeping them flying while making the message, and hauling them down on its completion.

Should a British merchant vessel wish to communicate by semaphore with one of His Majesty's ships, with another British merchant vessel, or with a Signal Station, she will hoist **J** flag alone, and keep it flying while making the message, hauling it down on completion.

If there should be more than one vessel within signalling distance, the vessel addressed may be indicated as in flag signalling.

### *Precautions when His Majesty's Ships are Cruising in Company.*

When men-of-war are cruising in company, it is very probable that frequent semaphore messages will be passing between the Senior Officer's ship and the remainder.

As International Code Flag "**J**" is also used by His Majesty's ships for semaphoring among themselves, merchant vessels should bear in mind that they are only addressed when one of His Majesty's ships hoists the Red Ensign.

In order to prevent possible confusion, the Senior Officer of His Majesty's ships cruising in company will probably, in order to leave his ship free to signal at a moment's notice with any of the ships under his command, detail off some ship (other than the one he is in) to deal with signalling which may be necessary between His Majesty's ships and merchant vessels.

### *To Exercise Semaphore Signalling.*

Should one of His Majesty's ships wish to exercise semaphore signalling with a British merchant vessel, she will hoist **E** flag under the Red Ensign wherever best seen, and **J** flag in any position inferior to it, keeping them flying while making the exercise and hauling them down on its completion.

Should a British merchant vessel wish to exercise semaphore signalling with one of His Majesty's ships, or with another British merchant vessel, she will hoist **E** flag alone at the masthead, and **J** flag in any position inferior to it, keeping them flying while making the exercise and hauling them down on its completion.

The man-of-war, if she is willing to exercise, will answer this by hoisting **E** flag under the Red Ensign, and the Code flag at the dip, and close up when ready to take in the exercise.

The merchant vessel, if she is willing to exercise, will answer this by hoisting **E** flag, and the Code flag at the dip, and close up when ready to take in the exercise.

If for any reason it is not desired to exercise, the signal **USX**—“*Sorry I am unable to comply with your request*” or some similar signal should be made by flags.

A semaphore signal may be made with the Naval mechanical semaphore or with small flags held in the hands. In either case it is very important that the sender should make certain that he has a good background.

As by far the best background is that afforded by the sky or sea, the sender should place himself in such a position where these conditions obtain. It is practically useless to semaphore against the upper works of a ship (unless the distance between the ships communicating is very close), as the position of the sender's arms are not sufficiently in relief in comparison with the dark or neutral surroundings afforded by objects immediately behind the sender. The best hand flags to use are small letter "O" flags, 18" or 22" square, mounted on sticks projecting below the flag the same number of inches.

The indicator in the Naval mechanical semaphore indicates from which side the signs and letters are to be read, and when closed indicates that the communication is finished.

A person wishing to signal will put his arms up to the alphabetical sign, and wait until the person to whom the signal is to be made hoists his Answering pennant close up.

He then will proceed with the message by spelling, making a momentary pause between each sign or letter. The arms are to be dropped between the words or groups.

Should the Answering pennant be dipped by the person receiving the signal, the sender will repeat, slowly, the last part of the message made before the pennant was dipped till the receiver hoists the Answering pennant close up.

When it is required to semaphore a message which contains figures it will in nearly all cases be found far less liable to error if they are spelt out; but they may, however, be signalled by putting the arms up to the Numeral sign and then making the numbers. When the signalling of figure signs has finished, and it is desired to resume spelling, the alphabetical sign should be made again to signify that the signs which follow are to be read as letters.

#### *How to Answer and Receive a Signal made by Semaphore.*

The Answering pennant is to be hoisted at the dip when it is seen that a ship or signal station, by hoisting the **J** flag, wishes to communicate by semaphore, and close up when the receiver is ready to read and write down the message.

It is to be dipped when a word is lost; the sender then to repeat slowly the last part of the message made until the Answering pennant is hoisted close up again.

One of His Majesty's ships taking in a semaphore signal from a British merchant vessel will hoist the Red Ensign where best seen, and keep it flying close up while the signal is being made, as well as answering the signal with the Code flag.

### FLASHING SIGNALS.—THE MORSE CODE.

In flashing, the Morse symbols are expressed by two elements called a dot and a dash. These are used singly as in letters **E** (- one dot) and **T** (— one dash), or in combination, as in letters **L** (- — —) or **A** (- —).

These symbols can be conveyed by several different means, such as waving a flag through short and long arcs, or short and long exposures of light, or by short and long blasts on the siren, steam whistle, or fog horn.

For flashing at a moderate rate, the dots, dashes, and spaces between them, should be made to bear the following ratio one to another in their relative duration of time :—

A dot is taken as a unit, and

A dash is equivalent to three units.

The space of time—

Between any two elements of a letter or sign is equal to one unit.

Between two complete letters or signs is equal to three units.

Between two words or groups is equal to six units.

In the International Code Signal Book it is arbitrarily laid down that the unit of time (for a dot or short flash) is one second. This, however, is obviously only intended as a guide for an abnormally slow sending, as it would be absurd to restrict a man to a rate of 1·4 words a minute (which a unit rate of one second works out to) if he was well capable of flashing *correctly* at the rate of six or more words a minute.

Although the rules prescribed above have been found most suitable for skilled signalmen, experience has proved that a slight modification is beneficial when flashing has, of necessity, to be made at comparatively slow rates. It is then best—while generally obeying the rules given in paragraph 2—to err on the side of making the dots rather shorter than their prescribed proportion to the dashes. In fact it hardly matters how short the dot is, as long as it can clearly be seen, but if the dashes are prolonged over their proportionate length, the distinction between a dot and a dash becomes comparatively all the greater.

Again, should the receiving signalman not be a skilled signalman, it is better to allow him a longer pause between the letters than three units, taking care, of course, to proportionately prolong the space between two words or groups.

#### *The Morse Symbols.*

Hereafter are shown the Morse Alphabetical Signs, which in no case consist of more than four elements. The general principle underlying the composition of these signs is that those letters which occur most frequently in ordinary English prose are given the shortest symbols. Thus, for every time the letter **Q** (the Morse symbol for which is — — — — 13 units) appears in ordinary English composition, the letter **E** (the Morse symbol for which is - one unit) appears about 140 times.

*Morse Alphabet.*

A	- - -	J	- - - - -	S	- - -
B	- - - -	K	- - - -	T	- -
C	- - - - -	L	- - - -	U	- - - -
D	- - - -	M	- - -	V	- - - -
E	-	N	- -	W	- - - -
F	- - - - -	O	- - - -	X	- - - - -
G	- - - -	P	- - - -	Y	- - - - -
H	- - - -	Q	- - - - -	Z	- - - - -
I	- -	R	- - -		

*Numerals.*

The following are the Morse Symbols for figures, which, if used, should be preceded by the Numeral Sign (- - - - -).

1	- - - - -	6	- - -
2	- - - - -	7	- - - -
3	- - - - -	8	- - - - -
4	- - - - -	9	- - - - - -
5	- - - - -	0	- - - - - - -

From the above, it will be observed that the symbols for figures always conform to the following rules :—

(a) They invariably consist of five elements — dots or dashes.

(b) Dots and dashes are not sandwiched ; the sign either begins with one or more dots or with one or more dashes.

*Caution against Numerals.*

In practice, however, it is found that the signalling of Numerals is likely to cause errors, and so it is far better (as it probably saves time and trouble in the end), when numbers occur to spell them out.

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### INSTRUCTIONS FOR THE CONDUCT OF SIGNALLING BY FLASHING, BETWEEN VESSELS OF THE MERCANTILE MARINE AND HIS MAJESTY'S SHIPS.

The following Instructions, which have been drawn up to facilitate signalling by flashing light between ships of His Majesty's Navy and the Merchant Service, differ somewhat from those which obtain in the International Code Signal Book.

The aim and object of the differences is to prevent any confusion which might otherwise arise owing to the similarity of procedure which exists with His Majesty's ships when signalling among themselves, and that laid down for flashing in the International Code Signal Book.

In addition to the Morse letters and numerals already given, the Special Signs shown hereafter are also necessary for the comprehensive use of flashing between ships of the Mercantile Marine and His Majesty's Navy.

*Special Signs.*

## British Signal Manual

Sign	$\text{---} \text{---} \text{---} \text{---}$	etc.
Answering Sign	$\text{---} \text{---} \text{---} \text{---}$	etc.
Spelling Sign	$\text{---} \text{---} \text{---}$	( <b>F F</b> as one sign).
Repeat Sign	$\text{---} \text{---} \text{---}$	( <b>I M I</b> as one sign).
Code Flag Sign	$\text{---} \text{---} \text{---}$	<b>M M</b> as one sign).
Erase Sign	$\text{---} \text{---} \text{---} \text{---}$	(Five <b>A</b> 's as one sign),
Full Stop Sign	$\text{---} \text{---} \text{---}$	(Three <b>A</b> 's as separate letters).
Stop Sign	$\text{---} \text{---} \text{---}$	etc (Succession of dashes).

*The British Signal Manual Sign.*

## The British Signal Manual sign

(  $\text{---} \text{---} \text{---} \text{---} \text{---}$  etc., etc.)

is the "Call" signal to be used by either His Majesty's ships or those of the Mercantile Marine when wishing to address one another by flashing.

*The Answering Sign.*

The Call signal (described above) is to be acknowledged by the "Answering" sign

(  $\text{---} \text{---} \text{---} \text{---} \text{---}$  etc.)

which, it will be observed, is the opposite in composition to the Call signal. It is made by the ship addressed, and indicates that she is ready to receive the signal which follows. It is also made to answer each Code group of a signal made from the International Code Signal Book, and also to answer the "Stop" sign (which indicates the conclusion of a signal) when the whole message has been made, to show the sending ship that her signals have been received

*The Spelling Sign.*

The "Spelling" sign (  $\text{---} \text{---} \text{---} \text{---}$  ) must be made previous to any letters which are intended to spell words. The receiving ship on perceiving this sign will show a steady light, obscuring it when a word is missed. On seeing the light obscured the sender will repeat the word *before* that at which the light was obscured. If the steady light is not shown again then the sender will repeat the word next before that, and so on until the steady light is again shown by the receiving ship, when the sender will proceed with the message.

*The Repeat Sign.*

The "Repeat" sign (  $\text{---} \text{---} \text{---} \text{---}$  ) may be used as follows :—

*To ask for a Repetition of One Word.*

The "Repeat" sign followed by the letters **W A** (signifying *Word After*) and the word (or, if necessary, words) immediately preceding the one required to be repeated.

*To ask for the Repetition of All after a certain Word.*

The "Repeat" sign followed by the letters **A A** (signifying "all after.")

*To ask for a Repetition of all the Message.*

The "Repeat" sign followed by the letters **A L L** (signifying "all.")

*The Code Flag Sign.*

The "Code Flag" sign (— — — —) is to be used when flashing those signals which contain the Code flag in the International Code Signal Book, such as those contained in the Urgent and Important, Numeral, and Latitude and Longitude Tables.

*The Erase Sign.*

Should the sending ship make a word or group incorrectly, she should immediately make the "Erase" sign (— — - — - — - —), which the receiving ship will acknowledge by also making the Erase sign; the sending ship will then repeat the last word or group made correctly, and continue with the message.

Should the whole of a signal be made wrong or incorrectly, the sender should call up again, and make the words "annul last message."

*The Stop Sign.*

The "Stop" sign (— — — — — a succession of dashes) is sent after the last group or word of a message has been acknowledged, and signifies that the whole of the signal is completed; the receiving ship is to acknowledge by the Answering sign.

*The Full Stop Sign.*

The "Full Stop" sign (— — - — - —) is made when that mark of punctuation appears necessary in the text of a spelt message.

*Procedure of Sending and Receiving Signals.*

A ship or station wishing to communicate by flashing will continue to make the Call sign (— - - - - - - - etc.) until acknowledged by the Answering sign. The receiving ship will continue to make the Answering sign as long as the Call sign is being made.

The sending ship, on seeing the Answering sign, will cease calling up, and will commence her signal, either spelling it out or making it by coded groups out of the International Code Signal Book. If the message is to be made by spelt words the sending ship is to make the Spelling sign (— - - - - - -), on seeing which the receiving ship will show a Steady light, when the sending ship will proceed with the message. If no Spelling sign is made it is to be understood that coded groups will be signalled. The sending ship will pause after making each group which, if received, will be acknowledged by the receiving ship making the Answering sign. If the Answering sign is not forthcoming the sending ship should repeat the group over again. When the sending ship observes that the last group has been answered she should proceed with the next group in a similar manner.

When the last group or word of the entire signal has been made and acknowledged, the sending ship will make the Stop sign (— — — — —), which will be acknowledged by the receiving ship making the answer. Signalling would then cease until a fresh call was sent.

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### SIGNAL LETTER SIGNALS MADE BY FLASHING.

The following letters, when flashed singly and repeated at intervals, without any preceding sign, are contained in the International Code Signal Book, and have urgent meanings:—

<b>U</b> - - - -	You are standing into danger.
<b>V</b> - - - - -	I want assistance, remain by me.
<b>W</b> - - - - -	Have encountered ice.
<b>P</b> - - - - -	Your lights are out, or want trimming.
<b>R</b> - - - -	The way is off my ship, you may feel your way way past me.
<b>L</b> - - - - -	Stop, or, heave to, I have something important to communicate.
<b>F</b> - - - - -	Am disabled, communicate with me.

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### PROCEDURE OF ANSWERING THE SEARCHLIGHT BY DAYLIGHT.

In the event of one of His Majesty's ships calling up a merchant ship or signal station in daylight by means of the searchlight (a method which may be employed when distance renders it impracticable to read flags or semaphore), the merchant ship or signal station should use the Answering pennant (Code flag) in the following manner:—

To be hoisted at the "dip" when the call is observed, and close up when ready to read the signals which will follow. To be dipped when a word or group is missed; the man-of-war will then repeat slowly the last part of the message made, until the Answering pennant is hoisted close up again.

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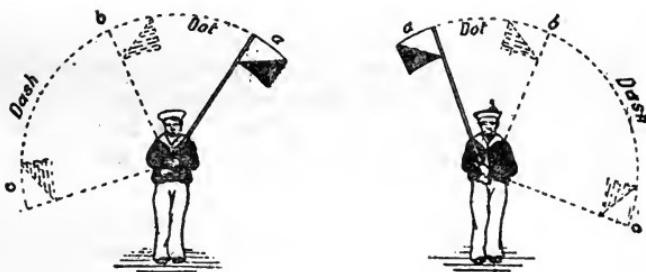
### SIGNALLING BY FLAG WAVING.

Semaphore signals have the great advantage that each sign is made in its entirety, and, as long as the relative position of the sender's arms can be clearly discerned, it is easy to read the letters at a good rate. A disadvantage incidental to the system is, however, that as each sign is a fixed signal, it requires a background which will afford sufficient relief to the arms to enable the signs to be made out at any distance. Sometimes conditions may obtain where flag signalling is impracticable, and when the background is so close or dark that the relative position of the sender's arms in semaphoring cannot be distinguished.

Such conditions may obtain when, for instance, it is desirable to signal off to a ship from the shore where a good background is unobtainable. It is then that flag waving may be profitably employed. This results from the fact that an object in motion, such as a white handkerchief or flag waved, is naturally far more attractive for calling up, and more conspicuous for seeing, than some stationary sign as with semaphore.

The more remarkable the contrast is between the colour of the flag used and the background, the better able is the receiver to make out the signal. Consequently Morse flags are generally made of two colours, all blue, or white with a narrow blue horizontal bar, so that the one which is likely to show up best can be selected. The sender must consider the background he affords from the direction of signalling and, all according to whether he presents himself against a dark or light background, he should use the flag of the opposite colour. The position of the sun must also be considered. As a general rule, if the sun is in front of the sender a white flag will be found most conspicuous; if the sun is behind the sender (unless the sender is himself in shadow), a blue flag will be found best.

The Morse flags mentioned above can be obtained in two sizes--three feet square and two feet square. The staffs are five feet six inches and three feet six inches long, respectively.



The manner of waving the flags through long and short arcs to represent dots and dashes is described hereafter. The signaller can either face or turn his back to the direction of signalling, according to convenience or direction of the wind.

In the normal position *a*, the flag should make an angle of about  $25^{\circ}$  with a vertical line through the centre of the body. The staff should be kept high enough to permit seeing underneath the flag while in motion.

To MAKE A DOT OR SHORT FLASH the flag is waved from *a* to *b* and, without any pause, back again to the normal position *a*.

To MAKE A DASH OR LONG FLASH the flag is waved from *a* to *c* and then, after the slightest perceptible pause, brought back to the normal position *a*.

WHEN SIGNALLING A LETTER the elements dots or dashes representing it should be made in one continuous wave of the flag, taking particular care that no pause is made when at the normal position. Thus, for example, to signal **F** - - - - the flag is waved from *a* to *b*, back to *a*, then (without a pause) to *b* again, then to *a*, and down to *c*, and, after the slightest perceptible pause, back again to *a*, the normal position, to *b* and *a* again.

HOW TO SIGNAL.—A pause equal to the length of a dash should be made at the normal position *a* between each letter of a word or letter of a Code group. When the word or Code group is completed, the staff is to be brought in to the front of the body, and the flag at the same moment gathered in. A slight pause should be made at the normal position before commencing a word or Code group.

POSITION OF THE SIGNALLER.—The signaller should stand exactly facing, or with his back to, the line of direction, according as the wind renders it most convenient. He must be careful to wave his flag in a vertical plane square to the receiver, and the pole must be kept as upright as possible while in motion, the point never being allowed to droop to the front. In order to keep the flag always exposed while waving it across the body to form the required signal, the point of the staff should be made to describe an elongated figure of 8 in the air.

THE PROCEDURE OF SENDING SIGNALS BY FLAG WAVING is similar to that laid down for flashing, as prescribed in the Manual. Ships and shore signal stations fitted with masts should, however, answer with the Answering pennant (Code flag), which should be hoisted at the "dip" when the call is observed, and close up when ready to read the signals which will follow. The Answering pennant should be dipped immediately a word or group is missed : the flag waver will then repeat slowly the last part of the message made until the Answering pennant is hoisted close up again.

In the event of having to signal to a party on shore where no Answering pennant or flag-staff is available, the receiver should answer by flag-waving (if he has no Morse flag he can wave his hat or hand-kerchief) by waving a **T** (dash) to acknowledge each word received. If this acknowledgment is not made, the sender must repeat the last word until it is.

The instructions relating to flag waving as contained in the International Code Signal Book (pages 552-555) should be ignored with regard to those details which differ from those to be found in the Manual. The modifications made have for their object greater simplicity in procedure, and are only applicable to British ships making use of the facilities of the British Signal Manual for mutual communication.

#### SIGNALLING MESSAGES BY CODE OR BY SPELLING.

There are two methods of signalling a message : either by translating it into Code from the International Code Signal Book and signalling the groups of letters which signify the sense, or else by spelling the communication straight out. Unless the message can be communicated by some short signal in code it will generally be found best to signal the message "en clair" by spelling each word out. If Code is used, a mistake in reading a dot or dash will give a false group, and the receiver, if in doubt about a letter, has no guide as to what it most likely should be. On the other hand, if spelling is employed, a missed or doubtful letter can often be supplied afterwards by the knowledge that the groups of letters received must spell some word of sense.

The following example is given in order to show the procedure.

### EXAMPLE OF FLASHING SIGNALS.

The steamer *Spheroid*, on returning from a voyage, makes the Old Head of Kinsale and reports herself by making her name as follows:—

#### **s.s. "Spheroid"**

(signalling)

Make the Call signal

(— — — — — etc.).

Makes the Spelling sign

(— — — — — etc.).

Makes:—I am steamship

*Spheroid* (by spelling).

Makes the Stop sign

(— — — — — etc.)

to indicate that signal is finished.

#### **Old Head of Kinsale**

(receiving)

Signifies ready to receive signal by making the Answering sign

(— — — — — etc.).

Shows a steady light while reading the signal.

Do.

**REPLY.**—The Old Head of Kinsale has received orders from the owners of the ss. *Spheroid* that she is to discharge her cargo at Antwerp, proceeds as follows:—

#### **Old Head of Kinsale**

(Signalling)

Makes the Call signal

(— — — — — etc.)

Makes the Spelling sign

(— — — — — etc.).

Makes:—Have received orders for you to discharge, etc. (by spelling).

Makes the stop sign

(— — — — — etc.)

to indicate that signal is finished.

#### **s.s. "Spheroid"**

(Receiving.)

Signifies ready to receive signal by making the Answering sign

(— — — — — etc.).

Shows a steady light while reading the signal.

Do.

Answers by making the Answering sign

(— — — — — etc.).

### SPECIAL TABLE OF SIGNALS.

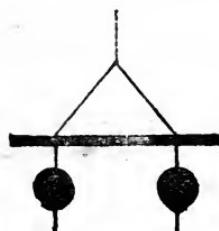
The Special Table comprises a few signals which are not to be found in the International Code Signal Book, and which it is thought may prove useful in communication between British men-of-war and merchant vessels.

For this purpose significations have been allotted to some of the unappropriated three flag signals after **Z N Q**.

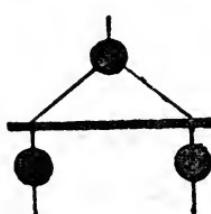
On and after the 1st of February, 1909, the Code Pennant will always be hoisted superior to any three letter hoist taken from the "British Signal Manual" to indicate that the hoist is to be looked out from that book, and *not* from the "International Signal Book."

Ammunition and Gunnery - - -	<b>Z O A</b> to <b>Z O Y</b>
Coal and Oil, &c. - - -	<b>Z P A</b> to <b>Z Q K</b>
Convoy - - - - -	<b>Z Q L</b> to <b>Z R J</b>
Enemy—General Reports - - -	<b>Z R K</b> to <b>Z S R</b>
Hospital Ships - - - - -	<b>Z S T</b> to <b>Z T H</b>
Torpedo - - - - -	<b>Z T I</b> to <b>Z T Y</b>
Water distilling - - - - -	<b>Z U A</b> to <b>Z U H</b>
Signalling - - - - -	<b>Z U I</b> to <b>Z U S</b>
Miscellaneous - - - - -	<b>Z U T</b> to <b>Z V Y</b>
Spare Signals - - - - -	<b>Z W A</b> to <b>Z Y X</b>

### SIGNALS USED AT LLOYD'S SIGNAL STATIONS.



This signal indicates that the station at which it is hoisted is temporarily closed, and that no communication can be held.\*



This signal indicates that telegraphic communication is interrupted, and that messages cannot be forwarded by telegraph, but will be forwarded by other means as soon as possible.\*

\* These signals will be kept up until the signal station is again occupied, or until telegraphic communication is again possible.

## SECOND MATE.—DEFINITIONS.

The Candidate is expected to write a short definition or answer, accompanied by a rough sketch or diagram, in the case of so many of the following questions as may be marked with a cross by the Examiner. The Examiner will mark not less than ten. The writing should be clear, and the spelling must not be disregarded.

1.—**Great Circles** are circles whose planes pass through the centre of a sphere.

NOTE.—A M Q Q', P N A P', and P T M P' are great circles. (Fig. 1).

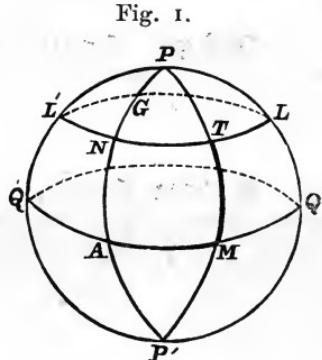
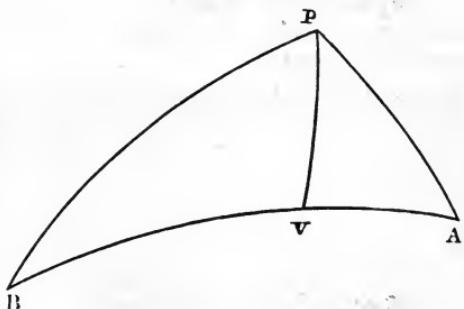


Fig. 1.

2.—**Vertex of a Great Circle** is that point of the great circle which is nearest the pole.

NOTE.—V is the vertex of the great circle B V A. (Fig. 2).



3.—**Small Circles** are circles whose planes do not pass through the centre of a sphere.

NOTE. N T L L' is a small circle. (Fig. 1).

4.—**Vertical Circles** are great circles passing through the zenith and perpendicular to the horizon.

NOTE.—All the lines passing through Z are vertical circles; the circle being the horizon.

They are also called **Circles of Altitude**, because altitudes are measured on them; and **Circles of Azimuth**, as marking out all points that have the same azimuth. (Fig. 3).

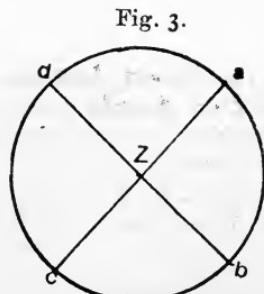
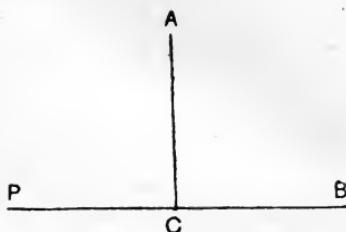


Fig. 3.

Fig. 4.



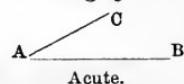
5.—**Right-Angle** is  $90^\circ$  or a fourth part of a circle.

NOTE.—A C B is a right-angle. (Fig. 4.)

6.—**Oblique Angle**.—Acute and obtuse angles are called oblique angles, less than  $90^\circ$  or greater.

NOTE.—C A B is acute, less than  $90^\circ$ . (Fig. 5.)

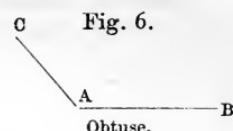
Fig. 5.



7.—**Obtuse Angle**.—An obtuse angle is greater than a right-angle, or more than  $90^\circ$ .

NOTE.—C A B is obtuse, more than  $90^\circ$ . (Fig. 6.)

Fig. 6.



8.—**Spherical Angle** is an angle contained by the arcs of two great circles at their point of intersection.

NOTE.—A P B is the angle. (Fig. 7.)

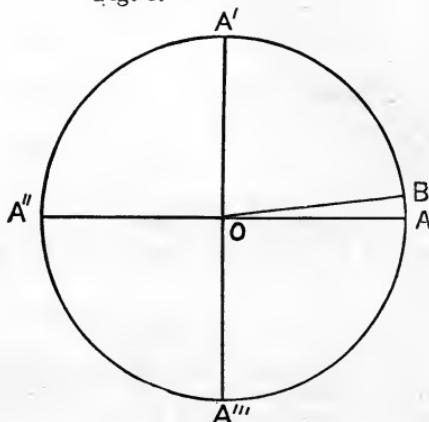
Fig. 7.



9.—**Arc**.—Part of the circumference of a circle.

NOTE.—A A' is part of the circle, the circle forming four right-angles. (Fig. 8.)

Fig. 8.



10.—**Complement of an Arc or Angle** is the remainder obtained by subtracting the arc or angle from  $90^\circ$ .

NOTE.—B A is the complement of the arc A' B. (Fig. 8.)

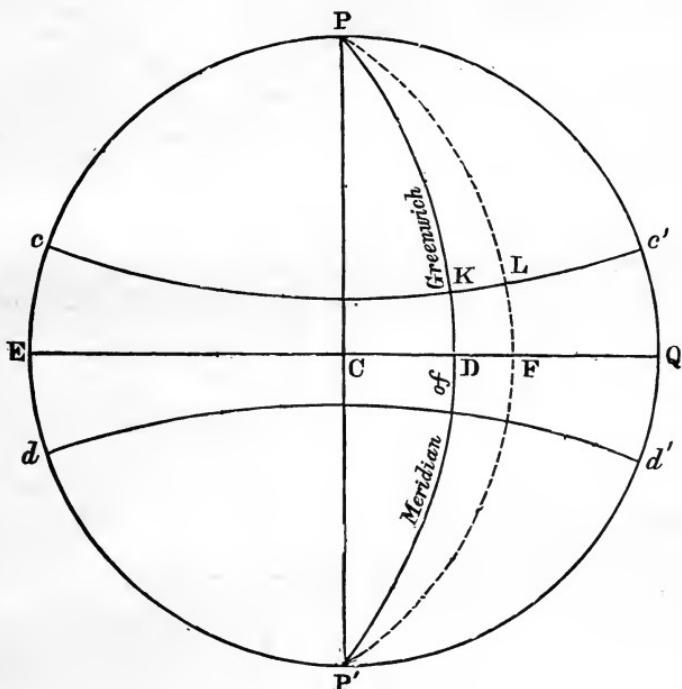
11.—**Supplement of an Arc or Angle** is the remainder obtained by subtracting the arc or angle from  $180^\circ$ .

**Note.**—B A is the supplement of the arc A'' B. (Fig. 8).

12.—**The Equator** is a great circle passing round the earth equal distance from each pole.

**Note.**—E Q is the equator. (Fig. 9).

Fig. 9.



P P' is the Earth's Axis.

P and P' are the Poles of the Earth.

E Q is the Equator.

a a', b b', c c', d d', f f', g g' are Parallels of Latitude.

P A P', P B P', P D P', &c., are Meridians of which P D P' is taken for the First Meridian.\*

P I F P' is the Meridian of L.

D G is the Longitude of J.

D B is the Longitude of S.

G J is the Latitude of J.

B S is the Latitude of S.

B G is the Difference of Longitude between J and S. W x y Rhumb Line.

\* *Meridians* are great circles on the surface of the earth, passing through the poles and cutting the equator at right-angles; and, therefore, secondaries to the equator. They are called *Meridians* because they mark all places which have noon at the same instant. They also mark out all places which have the same longitude, and are hence called "*Circles of Longitude*." The definition above is only correct if the earth is regarded as a sphere. If we take into account that the earth is an oblate spheroid, it must be replaced by the following:—Meridians are the sections of the earth's surface by planes passing through the two poles. The curves are ellipses, the major and minor axis of which are respectively the equatorial and polar diameter of the earth.

✓ 13.—**The Poles of the Earth** are the two extremities of the axis about which it revolves.

NOTE.—P P' are the poles. (Fig. 9).

✓ 14.—**A Meridian** is a great circle passing through the poles perpendicular to the equator.

NOTE.—P A P', P B P', P D P', are meridians. (Fig. 9).

✓ 15.—**The Ecliptic** is a great circle representing the apparent annual path of the sun in the heavens.

NOTE.—The circle is the horizon, E Q the equator, c c', a a' the tropics, a c' the ecliptic. (Fig. 10).

✓ 16.—**The Tropics** are two small circles parallel to the equator,  $23^{\circ} 28'$  N. and S.

NOTE.—c c', a a' are tropics; tropic of Cancer N., Capricorn S., and equal to the sun's greatest declination. (Fig. 10).

Fig. 10.

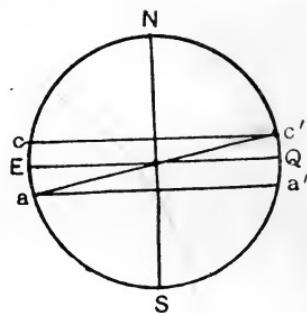


Fig. 11.

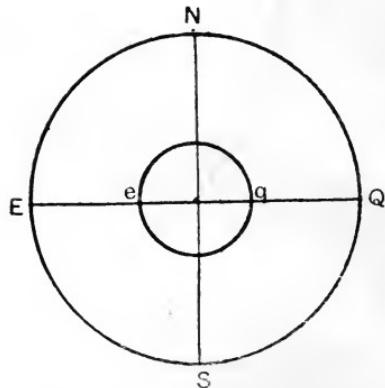
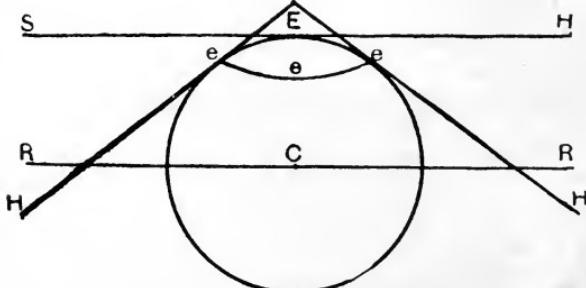


Fig. 12.

✓ 18.—**The Visible Horizon** is the boundary of our view whether of the heavens or of the earth.

NOTE.—The circle is the earth, O H, O H the visible horizon. If an observer was stationed at O he would see more than half the heavens, but only a small portion of the earth, as E e e e. (Fig. 12).



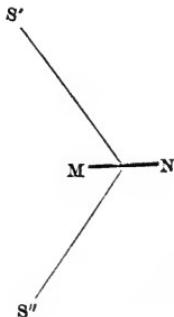
✓ 19.—**The Sensible Horizon** is a plane passing through the station of the observer.

NOTE.—S H is the sensible horizon. (Fig. 12).

✓ 20.—**The Rational Horizon** is a plane passing through the centre of the earth.

NOTE.—R R is the rational horizon. C is the centre of the earth. (Fig. 12).

Fig. 13.



✓ 21.—**Artificial Horizon** is a reflector, whose surface is perfectly horizontal, used to observe altitudes on shore.

NOTE.—The image of an object reflected from a horizontal surface appears as much below the horizontal line as the object itself is above it; and hence the angular distance between the object itself and the reflected image gives double the altitude of the object.

✓ 22.—**Parallels of Latitude** are small circles parallel to the equator.

NOTE.—a a', b b', and c c' are small circles. (Fig. 9).

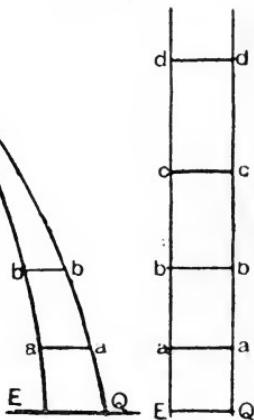
✓ 23.—**Difference of Latitude** between two places is the arc of a meridian included between their parallels of latitude.

NOTE.—J R is the difference of latitude between J and S, or J and R. (Fig. 9).

✓ 24.—**Meridional Parts** are certain numbers formed on such a basis that the earth's globular surface can be projected into a plane such that, while the parallels of latitude and also the meridians are parallel straight lines, every place on the earth's surface is in its proper place.

NOTE.—In the chart on MERCATOR's projection the degrees of longitude are made everywhere the same length, and, therefore, to preserve the proportion that exists at every part of the earth's surface between the degrees of latitude and the degrees of longitude, the former must be increased from their natural lengths more and more as we recede from the equator. The lengths of small portions of the meridian thus increased, expressed in minutes of the equator, are called meridional parts; and the meridional parts for any latitude is the line expressed in minutes (of the equator) into which the latitude is expanded. If the two lines at P were drawn out until parallel to each other, they would then show the expanded meridians. (Fig. 14),

Fig. 14.



25.—**Longitude.**—The longitude of a place on the earth's surface is the arc of the equator intercepted between the first meridian and that passing through the place.

NOTE.—D G is the longitude of J. D B is the longitude of S. (Fig. 9).

Longitudes are reckoned from the origin—the intersection of the equator by the first meridian—eastward or westward, either in arc to  $180^{\circ}$ , or in time  $0^{\text{h}}$  to  $12^{\text{h}}$ . Thus we can measure longitude by an angle at the pole.

26.—**Difference of Longitude** between two places is the arc of the equator between their meridians.

NOTE.—B G is the difference of longitude between J and S. (Fig. 9).

Fig. 15.

27.—**Departure** is the distance, in nautical miles, made good due East or West.

NOTE.—CB is the departure. CA diff. of lat. (Fig. 15)

28.—**Nautical Mile.**—The mean length of a minute of latitude is 6080 feet.

NOTE.—The number 6080 has been generally adopted as a convenient value for the knot, and is, in general, sufficiently near for practical purposes. It is strictly the value of a minute of latitude on the parallel of  $48^{\circ}$ , and varies with the latitude.

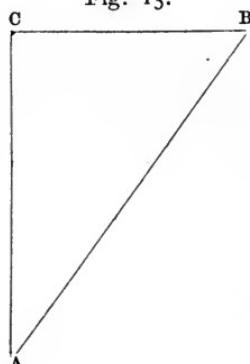
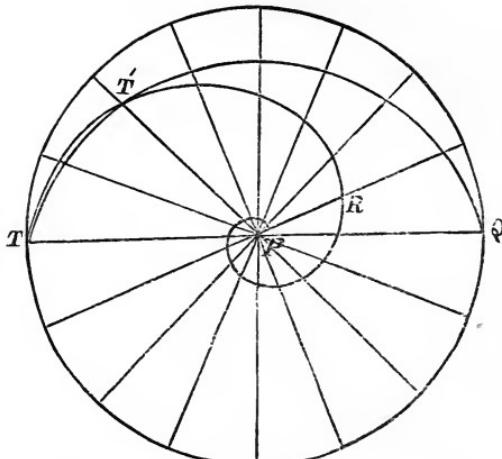


Fig. 16.

29.—**Rhumb Line.**—The curve on the earth's surface which cuts all the meridians at the same angle

NOTE.—P is the pole, TT'Q a great circle, TT'R the rhumb line. As the meridians all converge to the pole, any rhumb curve, if continued, will wind round the globe and approximate to the pole without, however, reaching it. Suppose from T, a place on the equator, a vessel sails to T', lying to the North. Then the great circle, TT', cuts the equator again at Q, but a track which cuts the successive meridians at the same angle, passing through T and T', will take the course indicated in the diagram, continually approaching the pole but never reaching it.



The great circle, TT'Q, does not require to be drawn. (Fig. 16).

30.—**Prime Meridian.**—The meridian from which longitude is reckoned. Greenwich is the British meridian.

NOTE.—P D P' is the prime meridian. (Fig. 9).

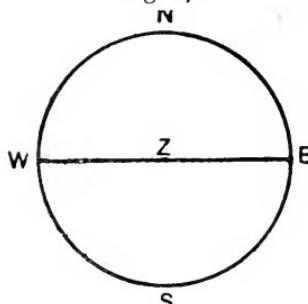
✓ 31.—**First Point of Aries.**—One of the points where the ecliptic cuts the equinoctial.

NOTE.—The circle is the horizon, W Q E the equinoctial, C  $\gamma$  G the ecliptic,  $\gamma$  the First Point of Aries. (Fig. 18).

✓ 32.—**Prime Vertical** is the vertical circle passing through the East and West points of the horizon.

NOTE.—The circle is the horizon, N S the North and South points, Z the zenith, W Z E the prime vertical. (Fig. 17).

Fig. 17.



✓ 33.—**Civil Time** is the time used in ordinary life to record events. It begins at midnight and ends the following midnight, reckoned from  $0^h$  to  $12^h$ .

NOTE.—A.M. problems, when given in civil time, want  $12^h$  adding to the hours and the day put one back, as the civil day commences  $12$  hours before the astronomical day. Feb. 12th,  $2^h 30^m$  A.M., would read Feb. 11<sup>d</sup>  $14^h 30^m$ .

✓ 34.—**Astronomical Time** begins at noon and ends the following noon, reckoned from  $0^h$  to  $24^h$ .

NOTE.—Problems given in astronomical time, no matter how small the hours, will have the letter  $d$  above the days. Ex.—June  $4^d 3^h 40^m$  would read in civil time June 4th,  $3^h 40^m$ . There is no A.M. or P.M. in astronomical time.

✓ 35.—**Sidereal Time** is the westerly hour-angle of the First Point of Aries.

NOTE.— $\gamma$  P Q sidereal time. (Fig. 18).

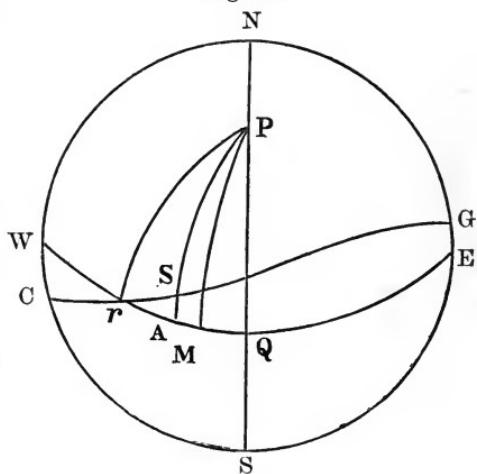
✓ 36.—**Mean Time** is the westerly hour-angle of the mean sun.

NOTE.—Q P M = mean time, or arc Q M, measuring from the meridian westward, M mean sun. (Fig. 18).

✓ 37.—**Apparent Time** is the westerly hour-angle of the apparent sun.

NOTE.—A P Q = apparent time, S apparent sun. (Fig. 18).

Fig. 18.



✓ 38.—**Equation of Time**—why it is used, and when it is at a maximum, and when at a minimum—is an angle at the pole between a meridian over the true sun and one over the mean sun. It is the

difference between mean and apparent time. It is greatest about Feb. 11th, May 14th, July 26th, and Nov. 3rd.

NOTE.— $M P A$ , or arc  $A M$ , equals equation of time. (Fig. 18).

✓ 39.—**Hour-angle of a Celestial Object** is an angle at the pole between the meridian passing through the object and the meridian of the observer.

NOTE.— $A P Q$  is the hour-angle of the sun  $S$ . (Fig. 18).

Diurnal time is defined by the motion of some chosen point in the heavens as it appears to revolve from east to west, and is measured by the angle at the pole of the heavens between the celestial meridian of the observer and the hour circle passing through the point of definition, reckoning westward. Thus we have *Sidereal Time*, *Apparent Time*, and *Mean Time*, according as the point of definition is the First Point of Aries, the actual Sun, or the Mean Sun.

The *Mean Sun* is an imaginary body, conceived to move uniformly in the equinoctial with the mean motion of the actual sun in the ecliptic.

Let  $S$  be the place of the sun in the ecliptic, and  $M$  the mean sun; through  $S$  and  $M$  draw the circles of declination  $P S$  and  $P M$ . The *sidereal time* is the angle  $Q P \gamma$ , or arc  $Q \gamma$ , *apparent time* is the angle  $Q P S$ , and *mean time* is the angle  $Q P M$ , or arc  $Q M$ , these angles or arcs being always measured from the meridian  $N S$ ; also, the angle  $M P S$  is the *equation of time*.

Let  $W Q E$  represent the equator,  $C \gamma G$  the ecliptic,

$N S$  the celestial meridian of the observer, who, for the sake of greater simplicity, may be supposed stationed at Greenwich.

Draw  $P \gamma$ ,  $P S$ ,  $P M$ , quadrants of four hour circles (circles of declination),  $P S$  cutting the ecliptic in  $S$ .

Let  $\gamma$  represent the First Point of Aries,

$S$  position of the true sun in the ecliptic,

$M$  " " mean sun in the equinoctial,

Then all distances measured eastward from  $\gamma$  on the equinoctial will give the R.A. of the objects, whose angular distances they measure.

Then  $\gamma P Q$  is the right ascension (R.A.) of meridian,

$\gamma P A$  " of the true or apparent sun,

$\gamma P M$  " of the mean sun.

Then, *Mean Time* is measured by the angle at the pole of the heavens between the meridian of the observer and the hour circle of the mean sun,  $Q P M$ , or arc  $Q M$ .

$A P Q$ , the angular distance of the apparent sun from the meridian, is the measure of *Apparent Time*.

The polar angle,  $M P A$ , subtended by the mean and true suns, is called the *Equation of Time*.

$\gamma P Q$ , the angular distance of the First Point of Aries from the meridian, is the measure of *Sidereal Time*; which is the same thing as if we had said, the angle at the pole eastward from the hour circle of the First Point of Aries to the meridian of the observer, or which is still the same, the right ascension of the meridian.

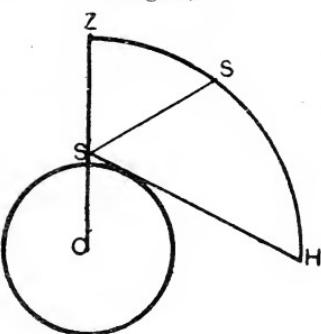
Hence the *sidereal time* and the *right ascension of the meridian* are synonymous terms.

And hence, also, when any celestial object is on the meridian, the *sidereal time* is equal to the object's right ascension.

Right Ascensions (R.A.) are reckoned from the First Point of Aries, eastward (in conformity with the direct motion of the heavenly bodies) from  $0^\circ$  to  $360^\circ$ , or in time from  $0^h$  to  $24^h$ .

Right Ascension, therefore, on the celestial globe, corresponds to *longitude* on the terrestrial globe; but with these differences: *longitude* is reckoned from the First Meridian which varies in different countries: whereas *Right Ascension* is always reckoned from the First Point of Aries. Again, *longitude* is reckoned towards the E. or W. up to  $180^\circ$  each way; whereas Right Ascension is reckoned always towards the East, and consequently up to  $360^\circ$ .

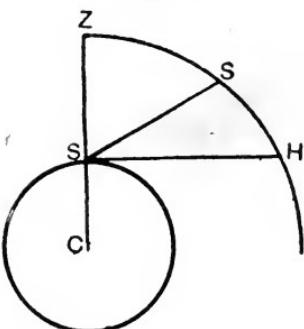
Fig. 19.



✓ 40.—**Observed Altitude** of a heavenly body is its distance from the horizon measured by a sextant.

NOTE.—S the sun, HSS its altitude, SZ its zenith distance. (Fig. 19).

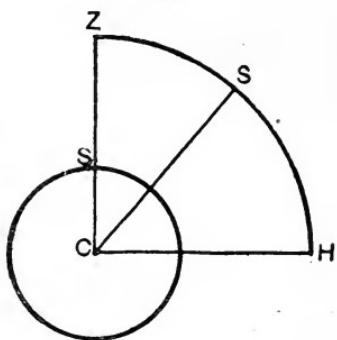
Fig. 20.



✓ 41.—**Apparent Altitude** is the altitude corrected for dip and semi-diameter (if any).

NOTE.—HSS is the apparent altitude. (Fig. 20).

Fig. 21.



✓ 42.—**True Altitude** is the altitude corrected for refraction and parallax (if any).

NOTE.—The circle is the earth, C the centre, HCS the true altitude, SZ its zenith distance. (Fig. 21).

✓ 43.—**Zenith Distance** is the complement of the altitude.

NOTE.—SZ is the zenith distance. (Fig. 21, or,  $oZ$ , Fig. 22).

✓ 44.—**Azimuth of a Heavenly Body** is the arc of the horizon between the North and South points and a vertical circle passing through the body.

NOTE.— $PZ\alpha$  is the azimuth of  $\alpha$ , measured by the arc N T. (Fig. 22).

Azimuth is usually reckoned from the North and South points, eastward and westward, from  $0^\circ$  to  $180^\circ$ .

✓ 45.—**Amplitude of a Heavenly Body** is the arc of the horizon between the East point and the centre of the body when rising, or the West point when setting.

NOTE.—ER is the rising amplitude, and is always of the same name as the declination of the body. (Fig. 22).

✓ 46.—**Declination of a Heavenly Body** is the arc of a circle of declination between the object and the equinoctial.

NOTE.—Do is the declination of the body o (Fig. 22).

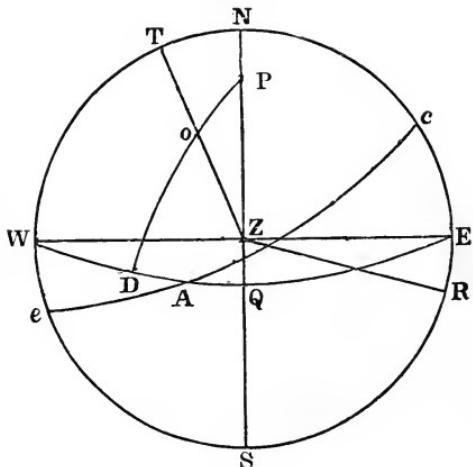
✓ 47.—**Polar Distance** is the arc of a circle of declination between the elevated pole and the object.

NOTE.—oP is the polar distance of the body o. (Fig. 22).

✓ 48.—**Right Ascension of a Heavenly Body** is the arc of the equinoctial between the First Point of Aries and the meridian passing through the body.

NOTE.—AD is the right ascension of the body o, measured eastward. (Fig. 22).

Fig. 22.



This figure represents the projection of the celestial sphere on the plane of the horizon. The principal advantage of this projection is that it exhibits at one view the whole hemisphere which is above the horizon.

The horizon, NESW, in this case appears as a circle, and the spectator must suppose himself looking down upon it from the Zenith Z; and all circles passing through the Zenith will appear as straight lines: thus we have—

N, the North Point; E, the East Point; S, the South Point; W, the West Point.

P is the Elevated Pole, and NP the Elevation of the pole equal to the latitude of the place of observation.

NZS is the *Meridian* of the observer's position, cutting the horizon in the North and South points; E and W are the poles of the meridian, for they are  $90^{\circ}$  distant from every point in that circle.

WZE, the vertical circle at right-angles to the meridian, is called the *Prime Vertical*.

W Q E is the *Equator* or *Equinoctial*.

$\circ T$  is the *Altitude* of a body  $o$ .

$Z o$  is *Zenith Distance* of complement of altitude  $o$ .

P o D is a *Circle of Declination*.

$\circ D$  is the *Declination* of a body  $o$ .

P o is its *Polar Distance*.

P Z o is the *Azimuth*, or Arc N T.

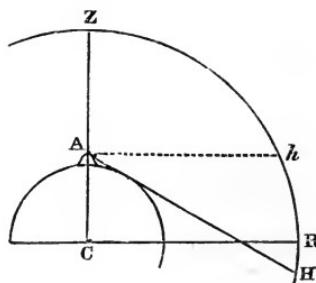
$\circ P Z$  is the *Hour-angle*, or Arc D Q.

$e A c$  is the *Ecliptic*, and A the *Equinoctial Point*.

A D or the angle A P D is the *Right Ascension*.

E Z R is the *Amplitude*, or Arc E R.

Fig. 23.



✓ 49.—**Dip, or Depression of the Horizon**, is the angle of depression of the sea horizon below a horizontal line drawn from the observer's eye, or the angle between the visible and sensible horizon.

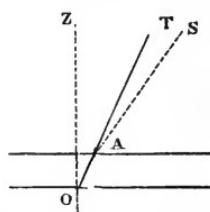
NOTE.—A H the visible horizon, A h the sensible, and the angle h A H the dip. (Fig. 23).

✓ 50.—**Refraction** of a heavenly body is the difference between the true place of an object and the apparent place as seen through the atmosphere.

NOTE.—O the observer, A the atmosphere where the rays enter, and the angle S O T is the refraction, Z is the zenith. (Fig. 24).

The rays of light passing through the atmosphere are bent out of their straight course into a curved line, and hence it happens that all the heavenly bodies, except when they are in the zenith, appear higher than they ought to do, and so much the more the nearer the nearer they are to the horizon. The horizontal refraction is about 33 miles, consequently, the sun and moon, at their rising and setting, are elevated by refraction, through an arc equal to their own diameters, nearly, and their entire discs appear above the horizon, touching it, when they are in reality completely below it.

Fig. 24.

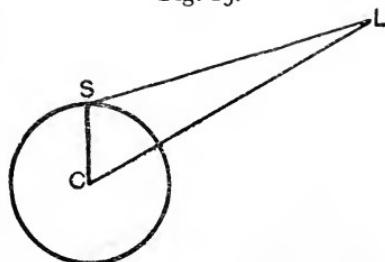


✓ 51.—**Parallax** of a heavenly body is the angle at the centre of the object subtended by that radius of the earth which is drawn to the feet of the observer.

NOTE.—S L C is the angle, the body being supposed at L. (Fig. 25).

The fixed stars are so distant from the earth that their relative positions are sensibly the same, from whatever point of the earth's surface we may view them. It is otherwise with

Fig. 25.



the sun, moon, and planets, which are near enough (especially the moon) to be displaced by change of station on our globe. Two spectators, situated on different points of the earth's surface and viewing the moon do not see it in the same direction.

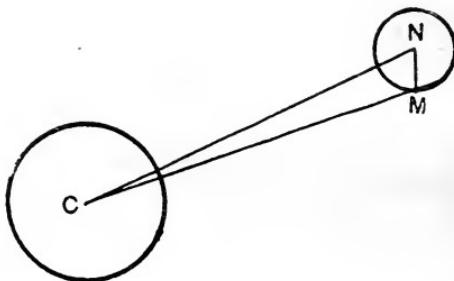
The word *parallax* is used to express the angle at any celestial body between two lines drawn from its centre to the points from whence it may be supposed to be viewed: or it is the arc of the celestial sphere between the two places, which a body would, at the same instant, appear to occupy if it were observed at two different stations,

**52.—Semidiameter** of a heavenly body is the angle subtended at the eye of the observer by the radius of the disc.

NOTE.—C the centre of the earth, N M the semidiameter, or half the diameter, M C N the angle. (Fig. 26).

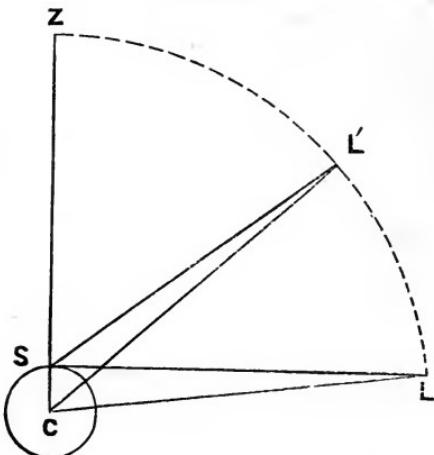
In order to obtain by observation the position of a celestial body which has a well-defined disc, we observe the position of some part of the limb and deduce that of the centre by a suitable application of the angular semidiameter of the body. The sun's semidiameter is given in the *Nautical Almanac*, page II of each month, for every day at noon, and that for the moon at page III for every day at noon and midnight. The semidiameter there given is the *angle at the centre* of the earth subtended by the semidiameter of the object, and because the observer being on the surface is *nearer* the object in every position, except when it is in the rational horizon, this angle requires a correction.

Fig. 26.



**53.—Augmentation of Moon's Semidiameter** is the increase of the moon's semidiameter, arising from the decreased distance from the moon as her altitude increases.

Fig. 27.



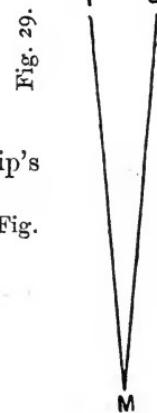
NOTE.—When the moon is above the horizon, as at L', its distance, S L', from a spectator at S is less than its distance, S L, when in the horizon at L. It is evident that as the moon increases in altitude, the nearer she comes to the spectator at S, and when in the zenith she would be nearer by half the diameter of the earth than a person stationed at C. The increase, or augmentation, of her diameter is a correction to be applied to the semidiameter as given in the *Nautical Almanac*, and is always added. (Fig. 27).

Fig. 28.



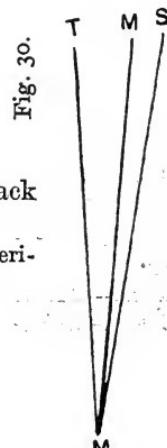
54.—**Magnetic Meridian** is the direction of the compass needle when it is unaffected by any local disturbing force.

NOTE.—It is a line passing through all places having the same variation. TM true meridian, mm' the magnetic meridian. (Fig. 28).



55.—**True Course of a Ship** is the angle a ship's track makes with the true meridian.

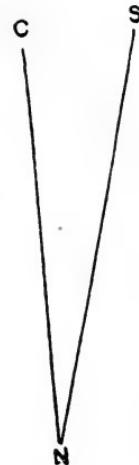
NOTE.—Angle M is the true course, TM the true meridian. (Fig. 29).



56.—**Magnetic Course** is the angle a ship's track makes with the magnetic meridian.

NOTE.—Angle MMS is the magnetic course, TM the true meridian, MM the magnetic meridian. (Fig. 30).

Fig. 31.



✓ 57.—**Compass Course** is the angle a ship's track makes with the compass needle.

NOTE.—Angle CNS compass course. (Fig. 31).

Fig. 32.



✓ 58.—**Variation of the Compass** is the angle through which the North point of the needle is drawn from the North by the magnetism of the earth.

NOTE.—TM the true meridian, M'M the magnetic meridian, angle TMM'. (Fig. 32).

Fig. 33.



✓ 59.—**Deviation of the Compass** is the angle through which the North point of the needle is drawn from the magnetic North by the magnetism of the iron of the ship.

NOTE.—TN true meridian, MN magnetic meridian, MNN the angle. (Fig. 33).

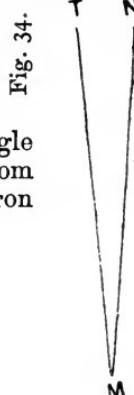


Fig. 34.

60.—**The Error of the Compass** is the angle through which the North point of the needle is drawn from the true North by the magnetism of the earth and the iron of the ship combined.

NOTE.—T M true meridian, T M N the angle. (Fig. 34).

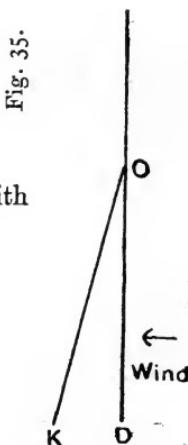


Fig. 35.

61.—**Leeway** is the angle a ship's track makes with her fore and aft line, or keel.

NOTE.—O D ship's keel, D O K the angle. (Fig. 35).

62.—**Does the Variation change with time?** Yes; at London it now decreases about 7' annually.

63.—**Is the Variation the same all over the world?** No; all amounts may be found.

64.—**Where do you find the Variation?** From a Variation chart, and on ordinary charts.

65.—**Does the Deviation change; if so, when?** Yes; from several causes. It changes rapidly in new ships, with a change of latitude, collision, heeling over, cargo of iron, or being struck by a heavy sea.

66.—**Where is the North Magnetic Pole situated?** In latitude 70° N., longitude 97° W.

**67.—Where is the South Magnetic Pole situated?** In latitude  $73^{\circ}$  S., and longitude  $147^{\circ}$  E.

**68.—Should the Compass Needle point to the Magnetic or True Pole of the Earth?** To the magnetic pole.

**69.—When is the Altitude of an object most seriously affected by Refraction?** When the altitude of the object is low.

**70.—Where is the Pole Star situated?** About  $1\frac{1}{4}$ ° from the North pole of the heavens.

**71.—Which is the most favourable time for determining the hour-angle of a celestial body, and thence the longitude, and state the reason why?** When the object is on the prime vertical, because then any error in the latitude or altitude would have the least effect on the computed hour-angle.

**72.—Describe the Construction of a Mariner's Compass.**—A circular card divided into 32 points, also into half points, quarter points, and degrees. It has one or more magnetised needles, a chrysolite, sapphire, or ruby cap, and balanced on a fine pointed pivot. The bowl is made of pure brass or copper, and slung in gimbals so as to retain a horizontal position.

**73.—Describe an Azimuth Compass.**—A compass of very superior construction specially fitted for taking bearings. It is mounted in a commanding position, so that an observer can sweep the horizon, and it is furnished with a pair of sight-vanes for observing objects elevated above the horizon.

**74.—Describe a Pelorus, and its use.**—The Pelorus, or dumb-card, is a compass card without needles, slung in gimbals in the centre of the ship, and fitted with sight-vanes. It is used for placing the ship's head on any direction where the correct magnetic bearing of an object is known, and for determining the deviation.

**75.—Describe a Chronometer, and its use.**—The chronometer is a timepiece of very superior construction, in which the balance wheel is so constructed that changes of temperature have the least possible effect on its oscillation. It is used for purposes when accurate time is required for finding the longitude.

## ADJUSTMENTS OF THE SEXTANT.

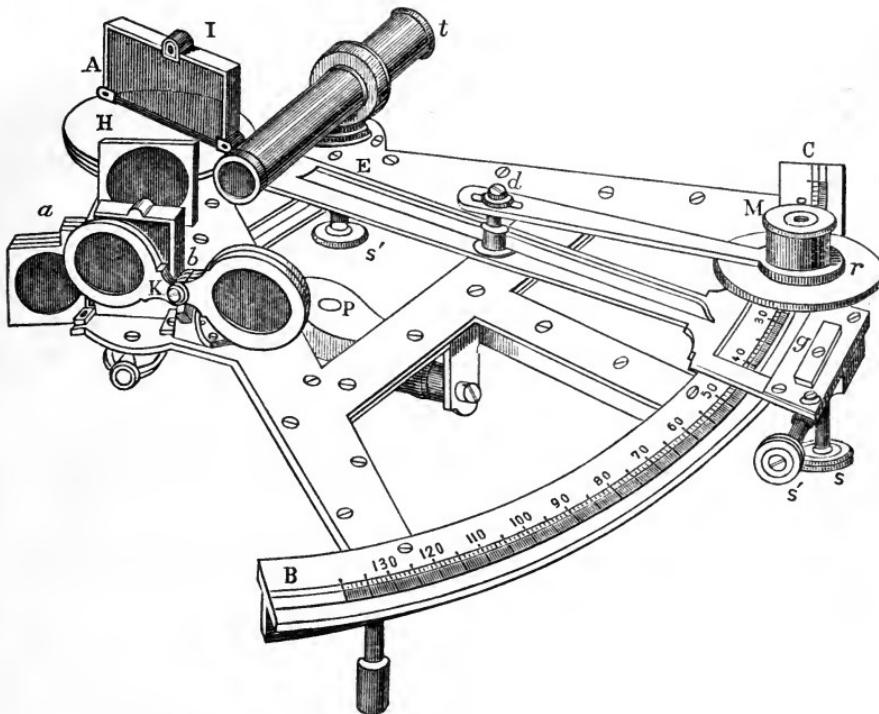
1.—What is the first adjustment of the sextant?

A.—The index glass must be perpendicular to the plane of the sextant.

2.—How do you make that adjustment?

A.—Place the index about the middle of the arc; and holding the instrument with its face upwards, look obliquely down the index glass; then, if the true and reflected arcs appear in one continuous arc, the adjustment is perfect; if not, adjust it by the screws at the back of the index glass.

Fig. 36.



3.—What is the second adjustment?

A.—The horizon glass must be perpendicular to the plane of the instrument.

4.—Describe how you make that adjustment?

A.—Place the index at O, and, holding the instrument obliquely, look through the telescope and horizon glass at the horizon; then, if the true and reflected horizons appear in one straight line, the adjustment is perfect; if not, adjust it by the top screw at the back of the horizon glass.

5.—What is the third adjustment?

A.—The horizon glass must be parallel to the index glass when the index glass is at O.

6.—How do you make the third adjustment?

A.—Hold the instrument vertically (the index being at O), and look through the telescope and horizon glass at the horizon; then, if the true and reflected horizons appear in one straight line, the adjustment is perfect; if not, adjust it by the bottom screw at the back of the horizon glass.

7.—In the absence of a screw, how would you proceed?

A.—Find the index error.

8.—How would you find the index error by the horizon?

A.—Hold the instrument vertically (the index being at O), and look through the telescope and horizon glass at the horizon; then move the tangent screw until the true and reflected horizons appear in one straight line, and the reading will be the index error.

9.—How is it to be applied?

A.—To be added if off the arc, and subtracted if on.

10.—Place the index at error of                  minutes to be added, clamp it, and leave it.

11.—The Examiner will then place the zero of the vernier on the arc, not near any of the marked divisions, and the Candidate will read it.

12.—How do you find the index error by the sun?

A.—Place the index at about 30' on the arc, and holding the instrument vertically, look through the telescope and the horizon glass at the sun, two suns will be seen; bring their upper and lower limbs in exact contact by the tangent screw, read off and mark down, then place the index at about 30' off the arc, or to the right of O, bring down the upper and lower limbs in contact, as before, read off and mark down; half the difference of these two readings will be the index error.

13.—The readings being 30' 50" on, and 33' 20" off, what is the index error, and how do you apply it?

A.—Thus:

$$\begin{array}{r} 30' \quad 50'' \text{ on} \\ 33' \quad 20'' \text{ off} \\ \hline 2) \quad 2 \quad 30 \end{array}$$

1 15 to be added, because the reading off is greatest.

14.—What proof have you that these measurements, or angles, have been taken with tolerable accuracy?

A.—By adding the two readings together, and dividing the sum by 4; if the measurements are correct, the result should be nearly equal to the semidiameter for the day as given in the *Nautical Almanac*. If they do not so agree, repeat the observations until they do.

The Candidate must point out the various screws used in adjusting the sextant.

## LIGHTVESSELS ON THE COASTS OF ENGLAND AND IRELAND.

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A white light is exhibited from the forestay of each lightvessel, at a height of six feet above the rail, for the purpose of showing in which direction the vessel is riding when at her station.

When a lightvessel is driven from her proper position to one where she is of no use as a guide to shipping, the following signals will be made, viz.:—

The usual lights will not be exhibited, but a fixed *red* light will be exhibited at each end of the vessel, and a *red* flare shown every quarter of an hour. By day, the balls or other distinguishing mast-head marks will be struck.

If from any cause the lightvessel be unable to exhibit her usual lights whilst at her station, the riding light only will be shown.

The mouths of foghorns in lightvessels are pointed to windward; also those on the land with the wind from seaward.

When, from any of the lightships, a vessel is seen standing into danger, a gun will be fired, and repeated until observed by the vessel; also, the two flags J D of the Commercial Code—" *You are standing into danger!* "—will be hoisted and kept flying until answered.

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## B U O Y A G E   S Y S T E M .

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### UNIFORM SYSTEM OF BUOYAGE FOR THE UNITED KINGDOM.

1.—The mariner, when approaching the coast, must determine his position on the chart, and must note the direction of the main stream of flood tide.

2.—The term Starboard Hand shall denote that side which would be on the right hand of the mariner either going with the main stream of flood, or entering a harbour, river, or estuary from seaward; the term Port Hand shall denote the left hand of the mariner under the same circumstances.

3.—Buoys showing the pointed top of a cone above water shall be called conical, and shall always be starboard-hand buoys, as above defined.

4.—Buoys showing a flat top above water shall be called can, and shall always be port-hand buoys, as above defined.

5.—Buoys showing a domed top above water shall be called spherical, and shall mark the ends of middle grounds.

6.—Buoys having a tall central structure on a broad base shall be called pillar buoys, and other special buoys, such as bell buoys, gas buoys, automatic sounding buoys, &c., &c., shall be placed to mark special positions either on the coast or in the approaches to harbours, &c.

7.—Buoys showing only a mast above water shall be called spar buoys.

8.—Starboard-hand buoys shall always be painted in *one* colour only.

9.—Port-hand buoys shall be painted of another characteristic colour, either single or parti-colour.

10.—Spherical buoys at the ends of middle grounds shall always be distinguished by horizontal stripes of white colour.

11.—Surmounting beacons, such as staff and globe, &c., shall always be painted of one dark colour.

12.—Staff and globe shall only be used on starboard-hand buoys; staff and cage on port-hand; diamonds at the outer ends of middle grounds; and triangles at the inner ends.

13.—Buoys on the same side of the channel, estuary, or tideway, may be distinguished from each other by names, numbers, or letters; and, where necessary, by a staff surmounted with an appropriate beacon.

14.—Buoys intended for moorings, &c., may be of any shape or colour according to the discretion of the Authority within whose jurisdiction they are laid, but for marking submarine telegraph cables the colour shall be green, with the word "Telegraph" painted thereon in white letters.

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#### BUOYING AND MARKING OF WRECKS.

15.—Wreck buoys in the open sea or in the approaches to a harbour or estuary shall be coloured green, with the word "Wreck" painted in white letters on them.

16.—When possible the buoy shall be laid near to the side of the wreck next to mid-channel.

17.—When a wreck-marking vessel is used it shall, if possible, have its top sides coloured green, with the word "Wreck" in white letters thereon, and shall exhibit

By day: Three balls on a yard 20 feet above the sea, two placed vertically at one end, and one at the other, the single ball being on the side nearest to the wreck.

By night: Three white fixed lights, similarly arranged, but not the ordinary riding light.

18.—In narrow waters, or in rivers, harbours, &c., under the jurisdiction of Local Authorities, the same rules may be adopted, or, at discretion, varied as follows:—

When a wreck-marking vessel is used she shall carry a crossyard on a mast with two balls by day placed horizontally not less than 6 nor more than 12 feet apart, and two lights by night similarly placed. When a barge or open boat only is used, a flag or ball may be shown in the daytime.

19.—The position in which the marking vessel is placed with reference to the wreck shall be at the discretion of the Local Authority having jurisdiction.

Vessels pass the wreck-marking vessel on the side where the two white lights or two balls are shown.

## L E A D   L I N E .

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In nautical phrase the lead line has nine marks and eleven deeps.

Q.—How would you mark the lead line?

A.—The lead line is marked thus :—

At 2 fathoms.	Leather with two ends.
“ 3 ”	Do. with three ends.
“ 5 ”	White rag.
“ 7 ”	Red rag.
“ 10 ”	Leather with a hole in it.
“ 13 ”	Blue rag.
“ 15 ”	White rag.
“ 17 ”	Red rag.
“ 20 ”	Cord with two knots in it.

Q.—How would you mark the deep-sea line?

A.—The deep-sea lead line is marked in the same manner up to twenty fathoms, after which there is a piece of cord with an additional knot for each ten fathoms, and leather for every five.

Q.—What is the distinction between the mark at two fathoms and that at three fathoms?

A.—At two fathoms the leather is put in the strand at half way, thus forming two tails; at three fathoms it is put in the same way, but one tail is slit, thus forming three tails.

Q.—In a dark winter's night, and your hands so benumbed with cold that you cannot distinguish the marks by the touch, what would you do?

A.—Put it to my lips, and if the white be a bit of canvas, the red a bit of bunting, and the blue a bit of cloth, the distinction will thus be apparent.

If the depth of water alongside corresponds with any mark, the leadsman calls *by the mark* 5 or 7, &c.; if he judges that the depth corresponds with a deep, *by the deep* 8 or 9, &c.; if three-quarter or half a fathom more than a mark, or deep, *and a quarter* 7 or 8, &c., or *and a half* 7 or 8; if a quarter of a fathom less, *a quarter less* 7 or 8, &c.

Q.—How is the nature of the ground ascertained?

A.—By the tallow in the hollow bottom of the lead; the lead is said to be *armed* when the tallow is placed in the hollow.

Q.—How would you proceed to get sounding with a deep sea lead line?

A.—Carry the lead line forward on the weather side outside of everything from the quarter to about the fore rigging, when it is bent to the lead. Station the men along the sides, each with a coil in his hand, the quantity of line to be hauled off the reel and passed forward depends upon the supposed depth of water. Stop the ship's way by reducing sail and rounding-to; or, if a steamer, ease the engines to dead slow, and when she loses her way stop her propeller. When the vessel's way has quite stopped, call out "*Heave*," when the lead is hove overboard forward, and as each man attending the line feels it tauten, and is sure the lead has not reached the bottom, he flings his coil overboard, passing the word to the next man aft by saying, "*Watch, there,*

*watch.*" If it has not reached the bottom before, the sounding is taken by the officer stationed on the weather quarter, with the line as nearly up and down as possible.

[It must be borne in mind, in all cases, that to get a correct cast of the lead a steamer must be brought head to wind and sea. In stormy weather it is also an important matter that the lead should be primed (even supposing that the nature of the bottom is not required), since by examining the arming when the lead is brought on board it can at once be seen if it has touched the bottom ; presuming, of course, that there is doubt in the matter. If you want a cast of the lead in deep water, say, from 90 to 100 fathoms, and it is blowing hard, with a heavy sea running, it is a difficulty sometimes not easily got over, especially with a steamer in ballast. Thus, say, the lead line is passed well forward, the lead armed, and everything is ready for a cast ; the engines are eased, and the vessel's way is stopped ; the lead is then hove, but before 100 fathoms of line is all run out you find that the vessel's bow has blown off the wind, consequently you cannot possibly get a correct cast. The best way to get an approximation to the depth of water is to pass the line from right aft of the taffrail to about 'midships, then heave the lead overboard amidships just before she has lost her way ; her bow may blow off then, but her stern remains, as it were, on a pivot, and the line in consequence does not trend out to windward. Care must be taken that the line does not foul the propeller. To get a correct deep water cast of the lead with a ship in ballast or high out of the water, as all seamen know, is one of the most difficult things to accomplish with certainty on a dirty night.]

## LOG LINE.

Q.—What is the principle of the log line ?

A.—The principle of the log line is, that each knot is the same part of a nautical mile as the number of seconds the glass runs is of an hour.

Q.—How many feet are there in a nautical mile ?

A.—6080.

Q.—How do you find the length of a knot corresponding to a glass which runs a given number of seconds ?

A.—As the seconds in an hour (3600) are to the seconds run by the glass, so are the number of feet in a nautical mile (6080) to the number of feet in a knot.

Worked out thus—

As	sec.	sec.	feet.	
3600	:	28	6080	: 47 ft. 3½ in.
			28	
			48640	
			12160	
3600)	170240	(47 feet.		
	14400			
	26240			
	25200			
	1040			
	12			
3600)	12480	(3½ inches.		
	10800			
	1680			

Q.—What are the *correct* lengths of a knot for a twenty-eight seconds glass and a thirty seconds glass (by rule above)?

A.—Forty-seven feet three and a half inches, and fifty feet eight inches.

Q.—What is the usual short rule?

A.—To the seconds run by the glass add a cypher, and divide by six, the result is the number of feet in a knot, and any remainder doubled will give the odd inches.

Q.—What is the length of a knot to a twenty-eight seconds glass by this rule?

$$\begin{array}{r} 6) \ 280 \\ \hline 46 - 4 \times 2 = 8. \end{array}$$

Q.—Is this strictly correct?

A.—No; because this method of finding the length of a knot proceeds on the supposition that 6000 feet equals a nautical mile, whereas there are 6080 feet in a nautical mile.

Q.—Why is this rule preferred?

A.—To prevent the ship getting ahead of her reckoning.

Q.—Suppose all your log glasses are broken, what would you use instead?

A.—A watch with a seconds pointer.

Q.—What stray line would you allow?

A.—From fifteen to twenty fathoms.

Q.—How would you mark a log line for a glass which runs twenty-eight seconds?

A.—First of all thoroughly stretch the line, measure off about 15 fathoms for stray line to allow the log-ship to get clear of the eddies in the ship's wake, and put in a piece of white rag. Then measure off 46 ft. 8 in., and put in a piece of leather for the first knot, two knots for the second, and so on: and between the knots place a single knot to denote half a knot more than the knot that is out. The line should be marked when wet.

Q.—When do you use the short or 14-seconds glass?

A.—When the ship is going fast through the water, in which case the knots run out in fourteen seconds are to be doubled if the line is divided for a 28-seconds glass.

# BOARD OF TRADE INSTRUCTIONS

*For the Guidance of Masters and Seamen when using the Mortar and Rocket apparatus for Saving Life.*

---

In the event of your vessel stranding on the coast of the United Kingdom, and the lives of the crew being placed in danger, assistance will, if possible, be rendered from the shore in the following manner, namely :—

1.—A rocket or shot with a thin line attached will be fired across your vessel. Get hold of this line as soon as you can ; and when you have secured it, let one of the crew be separated from the rest, and, if in the day time, wave his hat or his hand, or a flag or handkerchief ; or, if at night, let a rocket, a blue light, or a gun be fired, or let a light be displayed over the side of the ship and be again concealed, as a signal to those on shore.

2.—When you see one of the men on shore separated from the rest wave a RED flag, or (if at night) show a RED light and then conceal it, you are to haul upon the rocket line until you get a tail block with an endless fall through it.

3.—Make the tail of the block fast to the *mast about fifteen feet above the deck*, or, if your masts are gone, to the *highest secure* part of the vessel. When the tail block is made fast, and the rocket line unbent from the whip, let one of the crew, separated from the rest, make the signal required by Art. 1 above.

4.—As soon as the signal is seen on shore a hawser will be bent to the whip line, and will be hauled off to the ship by those on shore.

5.—When the hawser is got on board, the crew should at once make it fast to the same part of the ship as the tailed block is made fast to, *only about eighteen inches higher, taking care that there are no turns of the whip line round the hawser.*

6.—When the hawser has been made fast on board, the signal directed to be made in Article 1 above is to be repeated.

7.—The men on shore will then pull the hawser taut, and by means of the whip line will haul off to the ship a sling life-buoy, into which the person to be hauled ashore is to get and be made fast. When he is in and secure, one of the crew must be separated from the rest, and again signal to the shore as directed in Article 1 above. The people on shore will then haul the person in the sling to the shore, and when he has landed will haul back the empty sling to the ship for others. This operation will be repeated until all persons are hauled ashore from the wrecked vessel.

8.—It may sometimes happen that the state of the weather and the condition of the ship will not admit of a hawser being set up ; in such cases a sling life-buoy will be hauled off instead, and the shipwrecked persons will be hauled through the surf, instead of along a hawser.

Masters and crews of stranded vessels should bear in mind that SUCCESS in landing them in a great measure DEPENDS UPON THEIR COOLNESS AND ATTENTION TO THE RULES HERE LAID DOWN; and that by attending to them many lives are annually saved by the mortar and rocket apparatus on the coasts of the United Kingdom.

The system of signalling must be strictly adhered to; and all women, children, passengers, and helpless persons should be landed before the crew of the ship.

## MANAGEMENT OF OPEN ROWING-BOATS IN A SURF.

### IN ROWING TO SEAWARD.

1.—If sufficient command can be kept over a boat by the skill of those on board her, avoid or “dodge” the sea, if possible, so as *not to meet it at the moment of its breaking or curling over*.

2.—Against a head gale and heavy surf, *get all possible speed on a boat on the approach of every sea which cannot be avoided*.

3.—If more speed can be given to a boat than is sufficient to prevent her being carried back by a surf, *her way may be checked on its approach*, which will give her an easier passage over it.

### ON RUNNING BEFORE A BROKEN SEA OR SURF TO THE SHORE.

1.—As far as possible avoid each sea by placing the boat where the sea will break ahead of her.

2.—If the sea be very heavy, or, if the boat be small, and especially if she have a square stern, *bring her bow round to seaward and back her in*, rowing ahead against each heavy surf sufficiently to allow it to pass the boat.

3.—If it be considered safe to proceed to the shore bow foremost, *back the oars against each sea* on its approach, so as to stop the boat's way through the water as far as possible, and if there is a drogue or any other instrument in the boat which may be used as one, tow it astern to aid in *keeping the boat end on to the sea*, which is the chief object in view.

4.—Bring the principal weights in the boat towards the end that is to seaward, but not to the extreme end.

5.—If a boat worked by both sails and oars be running under sail for the land through a heavy sea, her crew should, under all circumstances, unless the beach be quite steep, *take down her masts and sails* before entering the broken water, and take her to land *under oars alone*, as above described. If she have sails only, her sails should be much reduced, a half-lowered foresail or other small head-sail being sufficient.

## GETTING BOATS IN.

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Q.—Your long-boat is alongside (on port side), proceed to get it in?

A.—Top up fore and main yards a little, secure them with lifts and preventer lifts. Haul in the port fore brace and starboard main brace, bring the two yards with the same drift as the long-boat, then rig the yard-arm purchases, then the midship purchase, hook on and heave away.

If the ship is long and the space between the masts great, then rig a span for the midship purchase.

Q.—What purchase would you rig at the yard-arm?

A.—Two good luff tackles, and the same amidships.

Q.—What would you have for a preventer lift for your yard?

A.—A good luff tackle, or the topsail sheets.

Q.—Describe how you would take in a jolly-boat with a single tackle?

A.—Pass a spar underneath both ends of the boat, hook the tackle on, crossing the parts of span on the hook so as to prevent its slipping, hoist away.

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## TAKING IN HEAVY WEIGHTS.

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Q.—What weight would you lift with a yard-arm tackle?

A.—Nothing heavier than a small cask of water. If compelled to use such a purchase for a heavy weight, untruss the yard, top it well up, and secure it well with lashings to the mast, rolling tackles, and guys.

Q.—How would you take in a heavy piece of machinery, say a boiler ten tons weight?

A.—Protect the side and decks with planks, and shore the beams well up in the between decks, haul the main yard forward a little on the side I was going to take the heavy weight in, top it well up, untruss it, and lash it to the mast, with plenty of canvas between the yard and mast. Then lash a derrick to the after part of the yard, a little outside where the yard plumbed the rail, placing the heel, with a piece of wood under it, on a beam, and lash the heel to the ring-bolts in the sides. Then pass three or four turns of a good hawser round the lower mast-head and main yard, a little outside of the derrick, frap them together, and ease up the lift. Next, lash a purchase block round the derrick-head, and reeve a good fall. I would also rig a derrick over the main hatchway, with a tackle on the head of it, and good guys from the derrick-head to the fore and mainmast-heads, resting the heel, with a piece of wood under it, on a beam abaft the main hatch, and lash it securely. I would use both tackles in hoisting it up and lowering it into the hold.

Q.—Some prefer a pair of shears instead of a derrick for lowering the weight into the hold, describe how you would proceed when taking out a heavy weight?

A.—I would rig a pair of shears over the hatchway, placing one leg at the port forward corner and the other leg at the starboard after corner. Guy the shears to the hawse-pipe forward and quarter hawse aft. Untruss the main yard and lash it to the mast, having mats to prevent chafe. Have another pair of shears placed in the gangway, lay the main yard in the shears, and lash all together. Use the shears over the hatch to lift the weight until it is high enough to clear the rail, then put on the yard-arm tackle, ease out, and, when clear of the rail, lower away.

Q.—You find the shear leg giving, what would you do?

A.—Bring the strain on the yard-arm tackle.

Q.—The shear legs are all right, but the yard-arm seems to be giving?

A.—Haul on the shear tackle, and get preventer lift up to the yard-arm.

NOTE.—In a steamer assist the purchases with her fixed purchases.

Q.—You are lying in a roadstead, the ship is rolling heavily, and you are discharging this piece of machinery, what purchases would you rig to keep it steady, supposing it is hove up to the level of the hatchway?

A.—Hook the yard-arm derrick purchase to the piece of machinery and heave taut, which will steady it from going over one way. From the other yard-arm have a gun-tackle purchase to it, this will steady it from going over the other way.

Q.—Suppose the ship were pitching instead of rolling, what would you do then?

A.—Have a guy from the foremast-head to the piece of machinery to keep it off the derrick as the ship pitches.

Machinery should be placed in the vessel before taking in any other part of the cargo, both on account of its great weight and to afford the opportunity of securing the several pieces properly by beds and chocks. Such articles as cog-wheels, and castings of similar shape, will be lashed vertically or edgeways to the mast, proper care, of course, being taken to chock them on each side with cases of goods, well Dunnaged.

Q.—You are in a steamer, having a boiler on board about 30 tons weight, it has to be discharged, your gear is not strong enough, there are no cranes or shears at the place of discharge, what will you do?

A.—I would go ashore and get a spar or a piece of timber for a derrick, the carpenter will round off the end, and make a hard wood shoe for it to rest in. This shoe must be well secured on the deck and shored up from underneath, get the derrick over end and secured to the masthead (having good preventers on the masthead) by several turns of a good hawser and frapped together, the heel to be secured by chain round the hatch coamings, the purchase is secured on the derrick-head, and well guyed on both sides for easing the weight over the side, and, if required, rig a boom over the ship's side to heave it off with.

Q.—There is a craft alongside with a new funnel, the old funnel has to be put on board the craft, and the new one shipped in its place, how would you do it?

A.—I would rig a span from each mast-head, the mast-head to be secured, then rig a pair of shears at the side fore-and-aft, and with the span purchase lift the old funnel, take care to have battens all round the funnel, and pass it to the craft by the span and shear purchases, then lift the new one by the shears and place in position by the span purchase.

## MISCELLANEOUS QUESTIONS.

The shears are alongside, how would you get them in ?

How would you place your mast alongside ?

How do you rig your purchase for taking your masts in ?

Where would you sling the mast (a foremast, say) ?

Which mast is taken first, which next, and next ?

How do you rig a lowermast ?

How do you get a top and cap over ?

How are the fore, main, and mizzen tops sent up ?

How do you send a topmast up ?

How do you rig a topgallant-mast ?

How do you rig a bowsprit ?

How do you reeve a lanyard ?

Your fore-yard is alongside on the port side, proceed to get it up ?

How do you rig a lower yard ?

How do you rig a topsail yard ?

Suppose you are close upon a wind, in moderate weather, with all your sails set, how will you tack the ship ?

How do you wear a ship with all her sails set ?

It blows hard, proceed to reef the topsails ?

How would you wear a ship under her courses ?

Suppose you are lying-to in a gale of wind, under a reefed main-topsail, you want the ship on the other tack, how will you wear in a great sea ?

Suppose she will not wear after all you have done ?

It blows hard, and you have split your foresail, how would you send another one up ?

How would you take a mainsail in, blowing hard ?

If, by accident, your ship is brought by the lee, what would you do ?

Suppose you are on a wind, and let the ship come up in the wind, and are all aback, what will you do ?

Suppose you are on a wind, close upon the land, and standing on must run on shore, and you can clear the land on the other tack, but it blows hard, and a head swell, that she will not stay ; and, should you wear, you would be on shore, how would you get upon the other tack ?

Suppose you are on a lee shore, and had room neither to wear or stay, nor any anchoring ground, how would you put the ship's head round the other way?

How do you tend a ship to a weather tide?

How do you tend to windward?

How do you tend to leeward?

How do you moor a ship with two anchors?

Your bowsprit is carried away, how would you secure the foremast?

Suppose both your bowsprit and foremast are sprung?

Your fore cap has worked loose, you find the mast head is gone, and a little below is good, what will you do?

If the trestle-trees were carried away, and you were afraid of the topmast coming down, how would you act?

Your rigging has become loose, being unable to set it up, what will you do?

If loading head to wind, in a roadway, how will you make a leeside for the lighters to discharge?

What are the limbers and their use?

Where are the sluices, and how are they worked?

How would you stow bale goods?

How would you stow casks?

How would you take a bower anchor away?

How would you hang the anchor to the boat?

How would you bend a warp to a kedge?

You are thrown on your beam ends, how would you act?

Steaming into a gale of wind, your fore hatch is stove in, what would you do?

Lying-to in a storm, your mainmast goes over the side; you are totally dismasted, and, consequently, quite unmanageable, what will you do to keep the ship from foundering by the sea striking her astern or amidships?

How would you take a crew off a wreck?

What would you place on a raft?

How would you rig a derrick to take in a heavy weight?

You have lost your rudder at sea, what method would you take to steer the ship?

Coming into soundings from a long voyage, how would you prepare for going into port and anchoring?

By whom are the entries made in the official log book required to be signed?

What is a manifest, and what are the items it contains?

If a vessel puts into a foreign port in distress, is the master bound to employ Lloyd's agent?

Who is the agent for all concerned?

What is a bill of lading?

How many bills of lading are usually signed ?

When the quantity, quality, or condition of the goods, &c., &c., are unknown, would you qualify your obligations in the bills of lading ; if so, how would you do it ?

What is a charter-party ?

What are the usual stipulations on the part of the owners or master in the charter-party ?

What makes a charter-party a legal document ?

What is meant by lay days ?

What is meant by demurrage days ?

How is demurrage claimed ?

Is it proper to give notice to the merchant of being ready to load ?

What is a bill of exchange ?

If you suspect your ship or cargo to be damaged, what is the first thing you would do on entering a port ?

What is meant by noting a protest ?

What should the survey report of a cargo particularise ?

What is meant by a bottomry bond ?

What is the difference between a bottomry bond and a respondentia bond ?

In what order are bottomry bonds payable, suppose more than one have been contracted ?

Is there anything payable before a bond of bottomry ?

If a master borrows money on bottomry, can he disburse the money as he pleases ?

What is the best night-mark for rounding the Manacles if bound into Falmouth ?

What are the dangers off the Start ?

Coming from the westward, in what latitude would you endeavour to make the Channel ?

In thick weather, how would you know when you are to the northward of Scilly ?

What soundings do you get in the fairway of the Channel ?

How do you know when you are on the French coast in thick weather ?

In coming into the Channel from the westward in thick weather, how do you know if you are too far to the southward or northward of the fairway of the Channel ?

Where do the Trade Winds blow ?

What causes them ?

What are the usual ice limits ?

How are the Tides caused ?

Where do the Monsoons blow, and what is the cause of them ?

How long does the tide run in the offing after the tide has turned inshore ?

## QUESTIONS IN SEAMANSHIP, &c.

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### MASTING, RIGGING, &c.

Q.—If you have a large ship just launched and lying in the river, the spars for shears floating alongside, how would you get them on board?

A.—Sling “skids” up and down the sides for the purpose of keeping the shear legs clear of the sides. Secure three or four small spars in a slanting direction from the bulwark to ease the shears down on. The shears being brought alongside, with their small ends aft, are taken on board either by parbuckle, derrick, or shears. As it is difficult to get heavy spars over the ship’s topgallant bulwark without breaking it, the better plan seems to be to have a pair of small shears forward with two tackles on the head of them, and to get the spars intended for shears in over the bows.

Q.—Next proceed to rig a pair of shears to take your mast in?

A.—Place their heads or small ends either on the taffrail, the break of the poop or a spar placed in a most convenient spot, the more elevated the better. Square the heels exactly one with the other, so that when they come to be raised the legs may be found of equal height. Cross their heads, placing the shear head on the side on which the mast is coming in uppermost, and put on the head-lashing of new well-stretched rope, the lashing being at equal distances from the heels of both. After the lashing is on, the lower part of the shears are drawn asunder, carrying one over to each gangway and placing it on a solid piece of oak or shoe,\* and lash them to the eye-bolts in the shoes; nail cleats on the heel of the shears to prevent the lashing slipping down. Clap stout tackles on the heels, two on each, one leading forward, the other aft; set taut the after ones and belay them. Lash a three or four-fold block, as the upper one of the main purchase, over the first lashing (so that it will hang plumb under the cross), with canvas underneath to prevent chafing, passing the lashing round each shear head alternately; also, sufficiently long to secure the free action of the block. Lash the small purchase block or truss block on the after horn of the shears, sufficiently high for the falls to play clear of each other, and a girline block above all. Middle a couple of hawsers and clove-hitch them over the shear heads—having two ends leading forward and two abaft, led through vial blocks, and stout luffs clapped on them. These should be sufficiently strong to secure the shears

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\* A “shoe” is a piece of wood about four feet long, two feet wide, and nine inches thick, with a hole in the centre for the shear to step in, and an *eye-bolt* at each corner for lashing it to the shear leg.

while lifting the masts. The lower purchase block is lashed forward round the knight-heads, or to a toggle outside the hole for the bowsprit, and the fall-rove—the hauling parts leading through the middle sheave-hole—and led away to the capstan. The shears are raised by heaving upon it, and preventing the heels from slipping forward by means of the heel tackles previously mentioned. When the shears are up, the heels confined to their shoes, they can then be transported along the deck by means of the heel tackles and guys to the situation required, taking care to make them rest upon a beam, and to have the deck properly shored up below. Finally, give the shears the necessary rake by means of the guys, and set taut all the guys and heel tackles.

Q.—What kind of head lashing would you put on ?

A.—A figure of eight lashing ; some prefer a round lashing.

NOTE.—If a round lashing is used, a round lashing of four inch is passed on the bight, with six or seven turns *on each end*, then back again with riding turns, making 23 or 27 turns in all, and knot.

Q.—If the head of your shears have not sufficient elevation to be easily raised, state what means you will take to help them up ?

A.—I would place a derrick near the ends, or between them, with a tackle on the head of it, and when I had elevated the head of the shears sufficiently to be afterwards raised by the main purchase, I would unrig it ; or I would rig a small pair of shears for this purpose.

Q.—Where is the proper place for the heels of the shears when ready for taking in the mast ?

A.—Before the mast-hole.

Q.—State how high the shears should be raised ?

A.—The main tackle must be brought nearly to the plumb of the mast-hole.

Q.—How will you place the masts alongside ?

A.—With the heads aft and foreside upwards.

Q.—In what order will you take your masts in, and state your reason for so taking them in ?

A.—If the three masts and bowsprit are placed by the same pair of shears, the mizzenmast is taken in first, the head being abaft the shears, so that they may be slided forward to take the other masts and bowsprit in. The mizzenmast is taken in first, because the breadth of beam is less aft than forward, and the heels of the shears being spread more as they go forward, the head lashing consequently becomes tauter ; moreover, if the mizzenmast was taken in *last*, the bowsprit must be got in *first*, and thus the advantage of securing the shears to the foremast-head when getting in the bowsprit would be lost.

Q.—Where will you lash your purchase block in taking in your mast ? State the rule.

A.—I would take the height of the rail to the position of the lower block, when the tackle is block and block, and lash the lower block to the mast alongside, *at a less distance from the heel than from the block to*

*the rail* and it must be above the part that takes the combings. Place canvas round the mast under the lashing, nail cleats above the lashing to prevent slipping.

Every person taking in a mast should know the distance from the upper purchase block to the rail, and should take care that the lower block is not lashed outside this distance, measuring from the heel of the mast, otherwise there will be a difficulty in getting it over the rail; or even should that be overcome the heel may not go into the mast-hole.

Q.—Take in your masts?

A.—The purchase block being lashed to the mast as just described (see last question), take the fall of the main purchase to the capstan and heave round till the mast is nearly at the height of the rail. Make a tackle fast to ease in-board. When the mast-head is over the rail put on trestle-trees, top, and cap; make girtlines fast to the mast-head, and the truss tackle fast below the top. Heave away till the mast is high enough, get the mast fair for lowering by means of the girtlines; wipe the tenon dry, and white-lead or tar both it and the step; lower away and step the mast. The mast being stepped and wedged, temporarily "come up" the purchase, man the guy and heel tackles, and transport the shears for taking in the mainmast. Proceed in a similar manner to take in the main and foremast.

Q.—What gear will you have on your mast-head before stepping it?

A.—Two mast-head girtlines with the blocks secured to the mast-head above the trestle-trees.

Q.—How will you transport your shears?

A.—I should haul the shears upright by the tackle on the guys, and bowse the heels of the shears forward, taking care to have a tackle on the after part of the heels to ease away with. I would next slack away the after guys, and haul on the fore ones at the same time.

In taking out a mast, which a mate has very often to superintend, though he seldom has the job of masting one, the shears are hoisted up singly and lashed aloft, and generally remain up till the new mast is taken in.

Q.—Make ready for taking in the bowsprit?

A.—Transport the shears as far forward as possible, or as the bows will permit. Bend on the girtlines to the small purchase block at the shear head to light it up, unlash it and lash it again to the forward fork or horn of the shears, pass a strap round the foremast-head, to which hook a large tackle, carry it well aft, and haul it taut for the purpose of staying the mast. Lash a couple of large single blocks to the foremast-head, middle a hawser and clove-hitch it over the shear-head, reeve the ends through the blocks at the mast-head, down on deck, carry them well aft, and take a turn. Hook the after heel tackles forward and take the after guys aft. Pass a bulwark lashing round each heel. Rake the shears over the bows sufficiently for the main purchase to hang directly over the gammoning scuttle, and make all fast.

Q.—State the rule for dropping the shear heads for taking in the bowsprit, how will you take it in and lash your purchases?

A.—The shears being dropped over the stem and secured, the large tackle made fast to the bowsprit *outside the distance from the heel to the knight-heads*, the truss tackle (or topping lift) fastened to a strop through the cap, and two guys hitched to bolts in the cap, the former to cant the heel, and the two guys to assist in steadyng the bowsprit when pointing the heel through the knight-heads; bring the fall to the capstan and heave round, taking in the slack and topping on the cap purchase when necessary. When high enough point the heel, having the partners well greased, when by easing away the main and topping on the cap purchase, working the guys at the same time, the bowsprit will come down in its place.

If the ship has a top-gallant forecastle the bowsprit cannot be taken in with the shears without the assistance of a derrick on account of the break of the forecastle, it not being prudent to step shears on the top of it.

Q.—Suppose you have topped the bowsprit well up by means of the truss tackle, and you find that you cannot get the shears sufficiently sloped to point the heel, what would you do?

A.—I would rig a jibboom or any other spar over the forecastle, lash the heel, and have a tackle on the outer end to haul the heel of the bowsprit out and point it.

Q.—How would you get the trestle-trees over with the mast standing, the shears being unrigged?

A.—The shears being unrigged there are only two methods (if the vessel is of any size) by which the trestle-trees can be got over; one plan is to take a chock out and sway them up with girtlines; the other is to lash a studdingsail-boom or other spar up and down the mast, and have two girtlines on the end; by the latter plan the trestle-trees can be slung amidships and easily placed over the mast-head.

Q.—How would you get the trestle-trees off the mast-head, no shears at hand?

A.—Get the lower yard on end, if large enough; if not, lash a spar, as a derrick, up the side of the mast, wedging off to clear the trestle-trees when lifting them, with a tackle at head of spar high enough above the lowermast-head.

Q.—Suppose you join a ship, say of a thousand tons, with her lower-masts and bowsprit in, and the heel secured, but none of the gear set up, lowermasts (trestle-trees on) with only a girtline block and girtline at the mast-head, and the shears sent on shore; proceed to get her rigged.

A.—I would first rig the bowsprit and secure it.

Q.—How would you rig and secure it?

A.—Set up the bobstays, pass and frap the gammoning, and set up the shrouds.

Q.—How do you pass the gammoning?

A.—From in, out, on the bowsprit, and from starboard to port.

Q.—How would you keep the bowsprit down in its place while rigging it?

A.—By sending out the jibboom, or by hanging a cask of water or a boat at the bowsprit end.

The jibboom in modern ships is entirely dispensed with.

Q.—What would you do after securing the bowsprit?

A.—Lash two blocks at the foremast-head as high up as I could get them (say on the after corners of the cap square), reeve the girtlines, and overhaul them down on deck.

Q.—For what purpose?

A.—To send the fore-top up.

Q.—How would you place the fore-top to send it from the deck, also proceed to get it over?

A.—The fore-top being placed on the deck abaft the mast, resting on its edge, the fore part uppermost and leaning against the mast. The girtlines are then passed along the underneath part of the top, hitching them to the after cross-trees, and put stops on all the cross-trees in the way of the bolt holes, and stop the rim. Have two guys, one leading forward and the other aft, from the fore and after parts of the top; sway away on the girtlines, and when the stops at the rim reach the blocks, cut these stops, and sway away again until the centre stops reach the blocks, then cut these stops. Haul upon the fore guy and ease away the after guy, and the top will then fall over the mast-head. Lower and bolt the top to the trestle-trees.

Q.—In sending the tops up, where do you lead the guys to?

A.—For the fore-top, the after guys go to the mainmast-head; the guys for the main-top to the fore and mizzenmast-heads; and the fore guy for the mizzen-top leads to the mainmast-head.

Q.—How do you send a mizzen-top up?

A.—Same purchase as I would for the fore-top, only having it on the fore side of the mast, the upper part facing forward and after edge uppermost.

The mizzen-top is also sent down on the fore side of the mast.

Q.—How is the top sent down?

A.—The main girtlines are bent as before, but the after girtline is bent to the fore part of the top, and used for canting it over the mast-head. When clear of the mast-head let it rest on the trestle-trees, stop also the girtlines to the fore part, then sway clear and "Lower away."

### PLACING THE STANDING RIGGING.

The rigging forming the largest angle with the spar is put on first, and that forming the smallest angle last, thus assisting to keep the other rigging in its place.

The only exceptions to this rule are the lower, topmast, and jib-stays; these being lashed at the mast-head are placed on top of the other rigging.

If lashings were placed below rigging they would be cut in the rolling of the ship, as they cannot be protected with serving, parcelling, &c.

Q.\*—From what kind of rope is standing rigging made?

A.—Shroud-laid.

Q.—How are the lowermasts rigged?

A.—With shrouds and a fore-and-aft stay.

To steady and secure a spar it must have at least three separate supports.

A rope supporting any mast from forward is called a *Stay*.

*Shrouds* are the side supports which go from the top or head of a mast to some place in a line with the bottom or foot.

*Backstays* are those going from the head of any of the upper masts down to the sides of the ship.

Q.—What is the measurement for the length of the foremost shroud?

A.—From half-way across the mast-head to the outside edge of the channel, abreast the foremost dead-eye.

Q.—How would you measure for a gang of (hemp) lower rigging?

A.—Having the length of the foremost shroud, place two posts upright at that distance apart, coil the shroud hawser round them, the second coil lying outside the first, flat on the deck; the third outside the second, and so on. Cut the bights where the coil was commenced.

Q.—Before fitting the rigging how much is it stretched?

A.—Stretch it about one inch for every foot, before cutting it.

It is better to let it remain on the stretch for a day or two before cutting.

Q.—What is the measurement for the eyes of shrouds?

A.—For the pair that goes on first, once and a quarter round the mast-head; each of the others in succession, the breadth of a seizing larger than the one below it.

Q.—How is wire lower rigging cut out?

A.—Measure the length for the foremost and after shrouds in the manner already given for hemp rigging, and divide the difference in length of the two shrouds among the intermediate ones, adding the diameter of the rope to each pair in succession.

Q.—What proportion must the lanyard bear to the shroud?

A.—Half the size.

Q.—What size lanyard would you reeve for iron wire rigging?

A.—The same size as the wire rigging.

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\* A candidate is expected to know a piece of right-handed or left-handed rope at sight, to test his knowledge of which the Examiner will, perhaps, say, "Take up that piece of rope (pointing to a piece on his table), and tell me what kind of rope it is?" or, "Take that piece of rope and coil it down for me," or, again, "Take that piece of rope and show me how you would turn a dead eye in?" He is expected to know how to make all the knots and bends, such as a reef, a bowline, a running bowline, a bowline on a bight, a carrick bend; to show also how you would bend a hawser to a kedge, how you would bend on the studdingsail-halyards; also to show how the strands lead in "Wall knots," Matthew Walkers," &c.

**Q.**—What proportion, with steel wire rigging, must the lanyard bear to the shroud?

**A.**—The lanyard should be one-third larger than the shroud.

**Q.**—What proportion must the dead-eye be to the shroud?

**A.**—Once and a half the size, to allow wood enough for the three holes.

### FITTINGS OF THE STANDING RIGGING.

**The Eye Splice.**—The simplest way to make fast a rope to support a spar is by splicing an eye in the end of the rope and placing it over the spar.

**Fork and Lashing Eyes.**—In some cases an eye-splice cannot be placed over a mast-head. A fork and two lashing eyes are then fitted, and the eyes are lashed together behind the spar.

(A fork with lashing eyes is the same as an eye-splice with the centre cut and the two parts lashed together again).

**Cut Splice.**—By forming two ropes into a cut splice by splicing one into the other, space is saved at the mast-head in rigging; but this fitting is not advisable on account of the strain brought on the back of the opposite splice, and is rarely used with rope, and never with wire.

**Throat Seizing on the Bight.**—When there are a number of ropes supporting a spar, as many as possible are fitted in pairs; the middle or bight of the rope is placed over the end of the spar, and a seizing is put on to form an eye. Thus, with an even number of ropes, they are fitted in pairs, with throat seizures on the bight. With an odd number they are all fitted in the same way except the odd one, which, being a single rope, is fitted with an eye splice.

**Horse Shoe.**—Immediately that a rope is bent it becomes weaker; therefore, all rigging should be kept as straight as possible.

In some cases the two legs of a pair of shrouds, &c., are required to be taken well apart from each other. If fitted with a throat seizing on the bight round the mast-head, too much strain would be brought on the seizing, besides bending the rope. Therefore, a short piece of rope is spliced into each leg to act instead of a seizing, forming a horse-shoe splice.

Another way of fitting rigging when the legs are spread apart is by crossing the ends and seizing them at the cross to form an eye.

All the standing rigging is *parcelled* and *served* over wherever it is liable to be chafed, where wet is likely to lodge, or where any of the strands have been opened for splicing.

The parcelling would not lie smooth on a large rope unless the hollows between the strands were first filled up with *worming*.

**EXAMPLE.**—All the large shrouds are wormed, parcelled, and served where they touch the mast-head to preserve them from the wet; and, if hemp, one-third of the way down each leg to protect from the chafe of the other ropes, and from the yard when braced sharp-up—with the exception of the foremost shroud, which is served all the way down.

With wire rigging they are served all over to keep the chafe of sails and gear from off the wire.

**Q.**—How is each pair of shrouds fitted?

**A.**—With a throat seizing on the bight round the mast-head.

(A strip of tarred canvas is put on first to keep the turns of the seizing from opening the service).

**Q.**—How is the after swifter on a single shroud fitted?

**A.**—With an eye spliced round the mast-head.

Q.—In rigging a mast which is the odd shroud?

A.—The foremost one.

Q.—State how the eyes are parcelled, and why?

A.—The eyes are parcelled upwards on each leg, meeting at the crown; for if put on in any other way the water, instead of running off, would get in between the parts of the parcelling and soon rot the rope.

Q.—How far is the foremost shroud served down, and why?

A.—All the way, as it catches the chafe of the sail.

Q.—How far are all the rest of the shrouds served down, and why?

A.—One-third, as the yard touches and chafes them when it is braced up.

Q.—In placing the rigging, how are the shrouds known from each other?

A.—They are all marked with knotted spunyarn; the pair going on first with one knot, the second with two knots. This brings all the odd numbered the starboard, and the even numbered the port side.

Q.—If the dead eyes are turned in, how may a starboard shroud be known from a port one?

A.—By the seizings being aft, and the end of the shroud inside on both sides of the ship.

Q.—Where would you secure your girtline block to send up the rigging?

A.—They are lashed to the after part of the trestle-trees. Some lash the girtline block to the cross-tree that lies next to the after part of the mast-head, considering that the most convenient place. The cross-tree before the mast-head is also used for this purpose.

Q.—Where would you bend on the girtline to the rigging to send it aloft, and how are the shrouds sent aloft?

A.—Bend the girtline on to the shroud, sufficiently below the eye seizing to allow the eye to go over the mast-head when the bend is at the block, stop the girtline along the upper part of the shroud with three or four stops to the end of the eye. "Sway away." Cut the stops in the top as they come to the block, and when the bend is at the block the men in the top place the rigging on the mast-head.

Q.—What part of the rigging do you send up first?

A.—The fore swifter.

Q.—How, and in what order, are the shrouds placed on the mast-heads?

A.—The bolsters having been well parcelled and tarred are put on, the starboard foremost pair of shrouds put on first, then the foremost pair on the port side, then the second pair on the starboard side, and so on, alternately, working aft; and the stay on, over all, outside and close down. The seizing of the first pair of shrouds on each side is placed as far forward on the trestle-tree as possible; the seizing of the second pair overlaps half of the seizing of the first pair, that of the

third pair overlaps half of the second pair, and so on. With wire rigging there will be room for the shrouds if the seizings are laid clear of each other.

Q.—How would you parcel the bolsters?

A.—Place the parcelling on two sides only of the bolsters, the side against the mast, and that on which the rigging is to rest.

Q.—What do the bolsters rest on?

A.—The trestle-trees, and the trestle-trees rest on the cheeks of the mast.

Q.—What is done next?

A.—The rigging and stays being placed over the mast-head are set up.

Q.—Which is set up first, the rigging or stays?

A.—The stays.

Q.—When setting up the rigging which pair of shrouds is set up first?

A.—The starboard pair, then the port pair, and so on.

Q.—Why?

A.—Because the starboard pair of shrouds is first on the mast-head.

Q.—How are jib, topmast, and lower stays fitted at the mast-heads?

A.—With a fork and two lashing eyes, which are lashed together abaft the mast-head with a rose lashing. Or sometimes the topmast stays are shackled together abaft the mast, and the lower stays, fitted with a long and a short leg, are shackled at the side.

If the topmost and lower stays were not fitted separately, but with throat seizings on the bight, if one stay were carried away the strain of the mast would be on the seizing. If carried away above the seizing, both stays would be gone. The seizing would likewise have to be put on aloft after the stays were placed.

The jib-stay is frequently rove through a hanging block shackled to a chain necklace at the fore-topmast-head, and the end secured with a chain slip at the jibboom end. It is set up with a purchase abaft the foremost.

Q.—Where do the two legs of the forestay come up?

A.—Away of the trestle-tree ends, underneath the foremost cross-tree leg of top.

Q.—How does the forestay set up away the bowsprit?

A.—In some cases the forestay is double; the bight is passed under the bowsprit, and it sets up with two eyes and a lanyard abaft the mast. In other instances it is single, has a collar, and is lashed at the mast-head, and the other end is roved through a bull's-eye, and is set up on its end; or a dead-eye is turned in, and it sets up with a lanyard to a heart in the bowsprit.

Q.—When set up to a dead-eye on the bowsprit how is the heart or dead-eye secured to the bowsprit?

A.—By a chain-strop round the bowsprit, and the dead-eye hooked or shackled to the strop.

NOTE.—The modern fashion is to have an iron band round the bowsprit with eye-bolts, one to each side.

Q.—How would you secure the end of a stay?

A.—By three seizings—a throat, quarter, and end seizings.

Q.—How would you set up a forestay on its end?

A.—Reeve the forestay through the heart or bull's-eye on the bowsprit; then set it up with two luff tackles, one on the stay and the other at the mast-head, hooking the lower block of the stay tackle to a strop clapped round the end of the stay.

Q.—How would you reeve a stay?

A.—From forward to aft.

Q.—How would you set up a forestay with lashing eyes abaft the mast?

A.—Get a tackle from the mast-head on to the bowsprit, and heave the mast well forward. Get two smaller tackles from the after part of the trestle-trees on to the stays to light the slack in. Pass the lashing from both ends and heave the turns tight with a Spanish windlass, after which I would frap the stays together and seize them just above the fore yard. If the two stays are frapped together one tackle is sufficient.

Q.—Where would you put the frapping seizings?

A.—Right above the fore-yard.

Q.—How would you stay your mast, supposing the stay sets up with a lanyard?

A.—I would hook one luff tackle to the mast-head near the trestle-trees, overhaul it down, put the other luff on the stay, allowing sufficient drift to stay the mast without fleeting; then hook the lower block of the lower tackle on to the lanyard of the stay, and hook the lower block of the mast-head tackle to the fall of the other tackle, and then haul away.

Q.—You are setting up the two foremost shrouds of foremast, how can you tell when the mast is plumb?

A.—By observing if both sides of the mast coating have an equal strain.

Q.—How would you put a mainstay on?

A.—Reeve it through the top, round the mast-head, and down the other side.

Q.—Where do the mainstays set up?

A.—To the knight-heads, or to a cross-piece before the fore bitts, or abaft the foremast to bolts in the deck which pass through the upper and main deck beams.

Q.—In setting up lower stays, why do you pull upon both ends of the lanyards?

A.—It enables more turns of the lanyard to be rove before pulling up, and secures an equal strain on all parts.

Q.—How are the standing parts of the lanyards of fore and main stays and bobstays secured?

A.—The standing part of the lanyard of a bobstay is rove with a running eye round the collar above the heart, and acts as a preventer seizing. The lanyard of a lower stay, being worked on both ends, has no standing part, and when rove full the ends are seized to the other parts of the lanyard.

Screws are extensively used now-a-days.

Q.—How are the hearts turned in or secured to the fore and main stays?

A.—The same as turning a dead-eye into a shroud; thus, the starboard stay is the same as the starboard shroud, and the port stay is the same as a port shroud. The starboard stay is placed above the port one on the mast-head; it is not uncommon to find the heart seized into a long eye-splice.

Q.—What is the reason that mizzen-stays are smaller than the rigging (fore and main stays being the reverse)?

A.—Because the braces on the mizzenmast, by leading forward, assist the stays.

Q.—State how you will turn in lower rigging, whether with or against the lay of the rope, and why?

A.—With the lay of the rope; turning in against the lay would open the lay and let the water in.

Q.—How is a dead-eye turned in, or secured to a shroud?

A.—Having parcelled the score of the dead-eye and hove the shroud taut round it, if right-hand-laid rope it is turned round the dead-eye *right-handed* or *with* the sun, and *against* the sun if hawser-laid; then pass the throat seizing with nine or ten turns, the outer turns being slacker than the middle ones. Pass quarter seizings half-way to the eye, and then the end seizings and cap, the shroud being well tarred under the cap.

NOTE.—Wire rigging is generally spliced in; but when it is turned in wire seizings are used.

Q.—How do you turn in cutter-stay fashion?

A.—The dead-eye being placed to the mark, the end is passed round it as before, but instead of being secured with a throat seizing, the end is passed round a standing part and to the part round the dead-eye with a round seizing, and another on the end round the dead-eye.

Q.—State how you would reeve lanyards?

A.—I would reeve the end of the lanyard through the hole of the upper dead-eye nearest to the end, and stop it with a Matthew Walker knot to prevent its slipping; the other end is passed through the hole of the lower dead-eye, and returning upwards, is rove through the middle hole in the upper dead-eye, and next through the middle hole of the lower dead-eye; and, lastly, through the foremost hole of both dead-eyes.

Q.—Why is the standing part of the lanyard roved first through the after hole of the dead-eye, and on the port side?

A.—Because the end of the shroud is on that side of the dead-eye; when setting the rigging up the most strain is on the other parts of the lanyard at the side of the dead-eye that the shroud comes round. The part nearest the purchase must therefore be forward immediately under the shroud, or the dead-eye would be turned round.

Always keep the knot of a lanyard when reeving to the left eye, or left hand.

Q.—Next, proceed to set up your lower rigging?

A.—Clap a selvagee-strop on the shroud, well up, to this hook the single block of a luff-tackle; the double block to a blackwall hitch in the lanyard; the fall is then made fast to the hook of the main tackle with another cat's paw or blackwall; reeve the tackle fall through the leading block and pull up, the lanyard being well greased to make the whole slide with ease through the holes in the dead-eyes. When the rigging is set up for a full due (which is when the masts are stayed forward and the stays all set up), the lanyard is first nipped, or stopped, and the end passed between the throat-seizing and the dead-eye with a hitch, then brought round all the parts it turns to expend the lanyard, and the end is well stopped to its own part with spunyarn. The ends of the shrouds are then cut square and capped, and the mats laced on.

Q.—How and where is the lower rigging secured?

A.—By lanyard rove through dead-eyes in the channels and others in the rigging; or sometimes it is set upon its end.

Q.—After setting up the rigging, how is the end of the lanyard secured?

A.—There are various methods of doing so; a very general practice is to pass the lanyard under the throat-seizing.

Q.—Where is the greatest strain on the lanyard when setting up; also, after it is up?

A.—On the hauling part in both cases.

Q.—Where is the standing part of the lanyard of a shroud secured?

A.—To the upper dead-eye, a knot being made on the end.

Q.—Which is the strongest way of securing a dead-eye?

A.—By a throat-seizing and two end-seizings.

Q.—With the rigging properly turned in cutter stay fashion, does the nip lie on the fore or the after side of the shroud, and why?

A.—On the starboard side, with the nip aft—port side forward; ends, on both sides, inboard.

The reason of this is, that rigging should be turned in as the ropes would be coiled down, so that it at once accommodates itself to the bend it would naturally take, and no turns are taken out of the lay of the rope. With left-handed rope the same principle holds good, and the result is necessarily reversed. However, for the sake of uniformity of appearances, both ends are generally turned in alike, with the nip forward.

Q.—When rigging is turned in with the end up, how does the end lie?

A.—With right-handed rope the end will be, on the starboard side, aft; and on the port side, forward; crossing inside. This was the old plan, but wire rigging is now often turned in end up, without crossing, with the end inside.

Q.—In turning in rigging, after forming the knot of the throat-seizing, what is done with the end, and should the end lie outside or underneath?

A.—The end of the throat-seizing is not cut off after the knot is formed, but two or three feet are left and expended round the shroud below the seizing; for, if cut off, there would be no end to work with on turning the rigging in afresh.

Q.—State the advantages and disadvantages of turning in cutter stay fashion?

A.—The cutter stay plan has the advantage of holding well, and it admits a sail when set upon a rope to be hauled down; but, on the other hand, it is weaker than the main part of the rope about one-tenth, principally caused by the compressure of its own running eye, which reduces the sectional area of the substance at that spot, and renders the rope less durable.

Q.—Of the three ways of turning in rigging, which is the strongest—end up, dead-eye spliced in, or cutter stay?

A.—By experiments on the three different plans it has been found that under the pressure of a breaking strain a shroud first gives way at the splice. The next weak point was found in the cutter stay plan, at the nip. The old plan broke at the main part of the rope, at the maximum strain, which, when the seizings are carefully put on, is therefore the strongest. But by working of the ship the seizings are liable to slip, and more strain is brought on one part than another, which is the reason that the cutter stay plan has been so generally adopted.

Q.—What is the use of the sheer pole?

A.—To keep the upper dead-eyes square in their places.

Q.—How far are the ratlines apart?

A.—Fifteen or sixteen inches.

Q.—State how the ratlines are seized on, and whether the clove hitch is inside or outside the shroud, and why?

A.—Splice the seizing of two yarn nettle stuff into the eye of the ratlines, pass it round the shroud through the eye *back* round the shroud, and so on; the eye lying athwartship.

The hitch crosses outside, for when you stand on the ratline it remains firmer, bearing against the shroud if hitched inside.

Q.—In marking the rigging for the ratlines, which shroud would you mark, and why?

A.—The foremost shroud, as the after ones are at an angle, and if marked would make the ratlines lie closer than required.

Q.—How is the bowsprit secured?

A.—By gammonings, bobstays, and shrouds.

Q.—Which gammoning is put on first, and why?

A.—The outer one, having more leverage on the bowsprit than the inner one, must be put on first; otherwise it would slack the inner one on its being hauled taut.

**Q.—How do you get the bowsprit cap on ?**

**A.—**Rig a stage under the bowsprit, and have a studdingsail-yard rigged up alongside the bowsprit with a block and line. Bend on the cap and send it out and knock it on—that is, if it is too heavy to put on by hand.

**Q.—How would you rig a bowsprit ?**

**A.—**In modern merchant ships all collars for stays, bobstays, &c., are of iron work, and fitted before the bowsprit is put in; fit the ridge-ropes, pass the gammoning, set up the bobstays and shrouds, and frap the gammoning.

Few ships have their bowsprit clothed exactly alike, but the following is the general plan :—At one-third in from the cap the rigging cleats are nailed round the bowsprit, and the rigging is placed in the following order; Inner bobstay collar, inner bowsprit shroud collars, inner forestay collar, middle bobstay collar, outer bowsprit shroud collars, outer forestay collar, outer bobstay collar.

At nearly the end of the bowsprit the iron stropped heart for the cap bobstay shackles on.

**N.B.—**Iron bowsprits are frequently secured with an iron gammon screwed down.

**Q.—Which bobstay would you set up first, and why ?**

**A.—**The inner bobstays are set up before those further out, otherwise you would be unable to work at the inner ones.

**Q.—Set up a bobstay ?**

**A.—**The single block of a luff is hooked to a cat's paw in the lanyard, the double block to a selvagee round the bobstay, the hauling part through a leading block on the bowsprit—led inboard, on to which another luff, or up-and-down, is capped along the bowsprit.

**Q.—How would you lay the topmast alongside ?**

**A.—**With its head forward and after part up.

**Q.—State where you would lash your top-block, and describe the operation of lashing it ; also, how you would send up a topmast.**

**A.—**The top-block is lashed to the head of the lower mast, just below where the cap fits on. Reeve a mast-rope through it from aft forward through the trestle-trees, and reeve it through the sheave-hole in the heel of the topmast, hitching it to its own part a little below the top-mast-head, and stopping both parts to the mast at intervals. Have a guy at the heel of the mast to ease it inboard. Snatch the mast-rope and sway away, attending to the guy when the heel of the topmast is near the rail, and get the topmast up and down the mast. As soon as the head is through the lower cap, cast off the end of the mast-rope, letting the mast hang by the stops, and hitch it to the eye-bolts in the other side of the cap. Cast off the stops and sway away again; fid it.

**Q.—How would get the lower cap on ?**

**A.—**The lower cap, if heavy, is generally placed on after the topmast is pointed through the top; or by means of a spar lashed to the mast-head, and separated therefrom by a wedge the thickness of the cap. To place the cap on by the former method, send it into the top by two girtlines, which being rove and overhauled down are bound to the fore

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part of the cap and stopped to the bolts; then "sway away," and when up place the round hole of the cap over the square hole of the trestle-trees for the topmast to reeve in; stop the cap to the sheave-hole of the topmast as the mast goes up, when high enough place it on the lower-mast-head, casting off the lashing that stopped it to the sheave-hole of the topmast; the cap is then driven close on to the lower-mast-head.

Q.—How do you send the topmast cross-trees up?

A.—If the cross-trees are heavy, they may be placed in the following manner:—Sway away until the topmast-head is a few feet above the lower cap; lash a block to the topmast-head, reeve a girtline from forward to aft and overhaul it down to the deck; send up the cross-trees by girtlines, and let the after part rest on the lower cap, and the forward part against the topmast; lower away the topmast until the cross-trees fall into their places, and then hoist until they rest on the shoulders.

Q.—Are the cross-trees bolted to the masts?

A.—No; they are bolted to the trestle-trees.

Q.—Rig a topmast in full detail?

A.—I would tar the bolsters and put them on. Some prefer chain spans to shackle the iron-bound block to. The most approved method is an iron plate with a hook on each end, which lies across the trestle-trees; next, put over the mast-head pendants; then follow the strops with thimble in for standing part of the ties. The *shrouds* are swayed up and placed over the topmast-head; the first pair on the starboard forward, then the port, and so on with the other pairs. *Backstays* are hoisted and placed the same as shrouds, starboard pair first; stays are swayed up and lashed abaft the topmast-head. After that the strops for the topsail *lifts*, and the studdingsail halyard *pendants*.

Q.—How would you place the foretopmast stay over the mast-head?

A.—Have the eye of the stay large enough to go over the mast-head, then over each arm of the leg of the cross-trees, so that the stay leads down under the fore leg.

Q.—In what order would you **set up** the topmast rigging?

A.—First the topmast-stays, then the backstays, and then the rigging.

Q.—How would you parcel the eye of a topmast-stay?

A.—Commence at the seizing, and parcel both parts with the lay of the rope towards the centre of the eye.

Q.—How would you serve it?

A.—Against the lay, beginning at the centre.

Q.—How and where is the topmast rigging secured?

A.—With dead-eyes and lanyards to the futtock shrouds, which, after reeving through the top, are secured alternately to the two neck-laces round the lowermast.

Q.—Where are the fore-topmast-stays secured?

A.—They are rove through the bees on the bowsprit through the bull's-eye on the knight-heads, and set up on its end with a luff-tackle, the double-block or the stay inside the bees, and the single-block on the end.

Q.—How would you set up the fore-topmast-stay with a lanyard?

A.—Reeve the stay through the bees on the bowsprit, then turn a dead-eye into the end of the stay, and shackle the other dead-eye to an eye-bolt on the knight-head. Reeve the lanyard, hook the single-block to the stay, close to the bee; take the fall to the capstan and set up.

Q.—Where are the main-topmast-stays secured?

A.—They are rove through iron-bound clump-blocks, shackled to loops on the foremast, and set up abaft the foremast with lanyards to bolts in the deck; or a bull's-eye hooked to an eye-bolt and set up on the end.

Q.—Where is the mizzen-topmast-stay secured?

A.—A strop with a thimble seized in it is placed on the mainmast-head, under the eyes of the lower rigging. The stay is set up with a lanyard to the thimble, or it is roved through the thimble and secured with a racking seizing to its own part.

Q.—How do you send up a topgallant-mast?

A.—The topgallant top-blocks being hooked, the *mast rope* reeves for the topgallant-mast as it does for the topmast. Take the end through the square hole in the fore part of the trestle-trees, half-hitch it through the fid-hole, and stop it round the hound.

Q.—How is the topmast cap sent up?

A.—They are swayed up by girtlines, which are to be lashed well up to the topmast-head for the purpose. Overhaul down before all the foremost ends, and secure them to the foremost bolts in the cap; stop them to the centre ones, and also to the square hole in the after part, then sway the cap up; when near up, cut the after stops, sway it upon the topmast-head, and the man aloft places it on, then beats it down firmly. The girtlines are unlashed and got down, and the topmast hove up and fidded.

Q.—How do you rig a topgallant-mast?

A.—First put on the grummet, then the stay and shrouds, then the backstays.

Q.—Where does the topgallant rigging set up to?

A.—The spider band on the topmast.

The topgallant rigging is generally roved through holes in the ends of the cross-trees, and set up with a lanyard to eye-bolts in the spider hoop. In some cases it is set up in the top, and in others it is passed through a bull's-eye, or thimble, and set up on its end.

Q.—How and where is the topgallant rigging secured?

A.—The two shrouds, after leading down through the horns of the topmast cross-trees and the rollers on the spider hoop on the topmast-

head, are spliced or toggled together, and the double block of a purchase fitted in the bight; the lower block is secured to the eye of the lower shrouds.

This ensures both the topgallant shrouds being always taut alike; or a more general way of fitting them is, after leading through the horns of the cross-trees, they are led across and are secured on the opposite side of the top, without using a spider hoop.

**Q.—How is the main-topgallant-stay set up?**

**A.—It is rove through a block strapped around the fore-topmast-head, or through the middle sheave in the after chock of the fore-topmast cross-trees, and set up in the fore-top.**

**Q.—Which is the larger, the topgallant backstays or the topmast shrouds?**

**A.—The topgallant backstays.**

#### RIGGING OF THE YARDS.

Every yard must have at the yard arms—

**A Jackstay for bending the sail to.**

**A Brace for altering the position of the yard when necessary.**

**A lift for supporting the yard-arm.**

**A Foot-rope for the men to stand upon.**

At the slings or bunt—

**Slings—Tie-blocks or Halliards—to support or hoist it.**

**Trusses or a Parrel—to keep it close into the mast.**

**Quarter-blocks—for the clewlines and the sheets of the sail set above it to reeve through.**

**Q.—Your fore-yard is alongside in the water, proceed to get it across the forecastle?**

**A.—Bring it alongside with the opposite yard-arm forward; that is, on the starboard side of the ship, place it with the port yard-arm forward; if it be on the port side, place it the contrary way.**

Reeve a tackle from the lowermast-head, overhaul it down and lash the lower block to the middle of the yard. Reeve a line through a block at the mast-head, overhaul down and bend it amidship, and stop it out to the yard-arms. Sway away on the tackle and gather in the slack of the line at the same time, so as to bring the yard up over end, and cast off the stops as the yard comes over the side, and get the yard-arm across the bulwark.

**Q.—Describe the present method of rigging the yard?**

**A.—Iron hoops with eye-bolts and thimbles in them for lifts to splice over and reef tackle blocks to shackle to, are generally fit on the yards. Short pieces of chain, with big links in one end and thimbles in the other, are used for the foot-ropes; the big links are placed over the brace-block eye-bolts, and the ropes are spliced over the thimbles. The brace pendants are often chain. The clew-garnet blocks are generally at the middle of the yard, but a better plan is to place them at the yard-arms; by doing so, and reeving the buntlines through**

thimbles half-way the sail, so that the lower half of them is abaft the sail, when the sail is hauled up in a gale of wind it is secure and almost furled.

Seize the leechline blocks and beackets on the jackstay. In large ships blocks are used for the topsail sheets; some ships have iron clamps and sheaves for them, and small vessels have iron sheaves in the yard-arms.

Q.—How would you rig it without iron bands?

A.—Lash the clew-garnet, reef tackle, topsail sheet, and leechline block. Rig the yard-arm thus:—First the grummet over, then the foot-rope, head-earring strop, brace pendant, and lift.

Q.—Now send it aloft?

A.—Overhaul the purchase down, and hook the lower purchase-block to the slings of the yard. Take the lifts aloft and reeve them. Then sway up, steadyng the yard by the lifts as it goes up. When high enough reeve the trusses, shackle the slings, and send the purchase down. Haul taut the lifts and braces.

Q.—What is a Flemish horse?

A.—A foot-rope outside the foot-rope of the yard.

Q.—How would you fit it?

A.—Splice the outer end into a thimble or eye-bolt at the yard-arm, seize the inner end inside the foot-rope of the yard to the jackstay, and hang it abaft the yard.

Q.—How would you rig a jibboom?

A.—Put on the grummet, the guys, martingale, stays, foot-ropes, and man-ropes; reeve the stays.

Q.—How would you rig out a jibboom, and what would you set up first?

A.—Hook a single purchase block on to the cap, reeve the heel-rope through the block and then through the sheave-hole in the jibboom, and make fast the end rove to the cap, heave away. Then set up the back-ropes, the jib-stays, place the foot-ropes in, and set the jib-guys up.

Q.—How do the jib-stay, fore-topgallant-stay, and fore-royal-stay set up?

A.—They generally reeve through holes or over sheaves in the jibboom, and they set up with a gun-tackle purchase, or with lanyards rove through thimbles or bull's-eyes, or eye-bolts.

Q.—Cross a topsail yard?

A.—The yard is brought alongside precisely the same as a lower yard. Bend a yard-rope to the slings, and stop it to the forward yard-arm; sway away until the yard is up and down; put on the lifts and reeve them as soon as it can be done; also reeve the braces. Sway away, cast off the stops, lower the upper lift and take in the lower one until the yard is square. When the yard is high enough steady it by the lifts and braces, and parrel it. If it be a lower topsail yard, truss it and sling it in a similar manner to the lower yard.

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Q.—In getting ready for crossing a yard, when are you sure that the lower lift is overhauled down clear?

A.—When it touches the yard-rope all the way up and down.

Q.—Cross a topgallant yard?

A.—These are sent up in a similar manner to a topsail yard.

Their lifts in some cases reeve through a bull's-eye seized in the rigging, and lead down and make fast to the cross-trees, but they often go with an eye-splice over the mast-head, so that the upper lift must be put on the yard-arm first, and then the yard hoisted chock up so as to get the lower lift on.

Q.—What extra rigging is there on the mainmast?

A.—A strop, with a thimble seized in for the mizzen stay to secure it, is placed under the shrouds.

Q.—What extra rigging is there on the fore-topmast?

A.—The jibstay. The two legs of the fork are rove from forward down through the fork of the topmast stays, and are lashed together abaft the mast-head under these.

It would be placed above the topmast stays and led straight to the jibboom if there were room for it between them and the underpart of the foremast cross-tree.

Q.—What extra rigging is there on a mizzen-topmast?

A.—A short pendant with a thimble spliced into the end hangs down on each side of the mast-head for the standing part of the main- topsail-brace to reeve through, and it passes up from the mizzen-chains. They are fitted with a cut splice, and are placed on the mast-head before the burton pendants. If fitted with a necklace the hanging blocks are used.

Q.—Why are the stays on the lower and topmast-heads placed on top of the rest of the rigging?

A.—By placing the stays on top of the rest of the rigging it takes up less room, and allows the yard to brace up sharper.

NOTE.—For the same reason the mizzen-stay is sometimes taken over the foremost cross-trees.

Q.—How would you rig a topmast stunsail-boom?

A.—Put on the lower halliard-block, tack-block, broom-braces, snotter and topping lift.

Q.—Describe single and double burtons?

A.—A single Spanish burton has two single blocks, the standing part spliced into the strop of the movable block, and the bight seized or bent to the hook. This increases the power three times.

The double burton has one double and two single blocks, the standing part spliced into the strop of the single block, then rove through the double or fixed block, and the bight seized to the strop of the lower block, to which the weight to be lifted is hooked. The end is then rove up through the double block, through the lower, and, lastly, through the single block to which the standing part is secured. This purchase gives an increase of five times the power applied.

Q.—How would you reeve the jib halyards?

A.—From aft forward.

Q.—How would you know the head of the jib from the tack in the dark?

A.—By the roping being on the port side, which is the case in all fore-and-aft sails.

Q.—How would you reeve the main-topgallant buntlines?

A.—Through a hole in the top and the hole in the cross-trees, through a block at the topgallant mast-head, and down through the lizard. Overhaul them down and bend on the sails.

Q.—How would you fit a main bowline?

A.—Put three cringles in the leech, have two bridles with a lizard on the lower one.

Q.—What is the longest rope, and what are the three strongest pieces of rigging?

A.—The fore-topgallant braces, when rove double, are the longest ropes; and the fore-stays, main-strokes, and lower rigging are respectively the strongest pieces of rigging.

Q.—Do the jib-sheets reeve inside or outside the fore tacks and bowlines?

A.—Lead inside the tack and outside the bowline.

Q.—Which is the upper side of a lower brace-block?

A.—The side which has the square head of the bolt in it is the uppermost, to prevent the bolt working out.

Q.—What is the difference between lower and topsail brace-block strops?

A.—A lower brace-block is fitted with a double strop, topsail brace-block with two single strops. The former—to make the block lie horizontal; the latter—vertical.

Q.—Through which sheave in a lower lift-block should the hauling part reeve?

A.—Through the foremost sheave, for if through the after one it would, on bracing up, bind against the lee rigging and prevent it being overhauled.

Q.—Through which sheave in the quarter-block do you reeve the sheet?

A.—The sheet is roved through the after sheave; for, on the *lower* sail being taken in, its clewline would lead across the sheet if roved through the foremost sheave.

Q.—Is a topsail sheet secured with an inside or outside clinch?

A.—They are secured with an outside clinch that they may be clear when required to be let go.

Q.—What is a jewel block?

A.—A strop'd block at the topsail yard-arm for the topmast staysail halyards.

Q.—How are the martingale stays set up?

A.—By the backropes, which are ropes to keep the martingale in its place.

Q.—What are the cap shrouds?

A.—Shrouds shackled to the lower cap, and set up on deck abaft the rigging to support the lower mast-head above the eyes of the rigging.

Q.—Suppose you have to unship your foremast, what spars will you use for shears?

A.—Take the fore and main-lower-yards for shears; strengthen them well with smaller spars from the slings to the deck, well lashed to the yard.

Q.—How would you send a topsail yard down?

A.—Send it down with a good luff-tackle, having the upper block lashed or hooked to the mast-head so as to hang free.

Lash the lower block to the *quarter* of the yard (*not amidships*) so that the yard will cant as soon as it is weighted with the tackle. Have a tripping line to each of the yard-arms, so as to cant the yard as may be required. Lower away, take off the braces as soon as the tripping lines are on, or when the yard is on deck.

Q.—How would you send a topmast down?

A.—Hook a top-block to the lower cap, reeve a good mast-rope through the block from aft forward, through the sheave hole in the topmast, and make the end fast to the eye-bolt on the other side of the cap. Slack up backstays, headstays, and rigging. Sway away gently on the mast-rope, knock out the fid, and lower away. Before the topmast-head clears the trestle-trees, rack the mast-rope towards the head to prevent it from falling over when the head is below the trestle-trees. Single the mast-rope, reeve the end through the sheave-hole at the topmast-head, then take a round turn round the topmast, hitch it to its own part, and lower away on deck.

Q.—What is the difference between topsails and courses in the make of their clews?

A.—Courses have a clew-rope.

Q.—Is there any difference in the number of cringles in the leach of a fore and main-topsail?

A.—The number is the same in each; for, in the fore-topsail, the reef tackle bridle hitches to a separate cringle; but in the main-topsail to the upper bowline cringle.

Q.—What is the difference between bowline and reef cringles?

A.—Reef cringles, and reef tackle bridle cringles, have thimbles, which bowline cringles do not require.

Q.—You are going to reeve a new coil of rope. What do you do after cutting the stop?

A.—Dip the end up through the centre, and thus a turn is taken out of every fake.

Q.—In a tackle of double blocks, where is the standing part, and why?

A.—Should be on the side of the block opposite the hauling part, as it thus leads fair, and counteracts the tendency of the hauling part to slue the block.

Q.—What is the comparative strength of wire with hemp rope?

A.—Wire rope is more than twice the strength of hemp rope of the same circumference; splicing a rope is supposed to weaken it one-eighth.

Q.—Which side of a sail is bent to the yard?

A.—A square sail is always roped on the after side, therefore always bend with the roping between the sail and the yard; otherwise the stitches would be chafed.

Q.—Is there any peculiarity in the make of lower tacks and sheets?

A.—They taper off towards the hauling end, for convenience of hauling.

### TO CALCULATE THE BREAKING STRAIN OF HEMP ROPES.

$$\text{Breaking weight in tons} = \frac{\text{circumference squared in inches.}}{4}$$

EXAMPLE.—What is the breaking weight of a rope eight inches in circumference?

$$\frac{8 \times 8}{4} = 16 \text{ tons.}$$

To find the weight which may be safely appended to a hemp rope:—

$$W = \frac{\text{circumference squared in inches.}}{10}$$

EXAMPLE.—What weight may be safely appended to a hemp rope ten inches in circumference?

$$\frac{10 \times 10}{10} = 10 \text{ tons. } Ans.$$

### TO CALCULATE THE SAFE LOAD WHICH MAY BE APPENDED TO CHAINS.

D = Diameter in eighths of an inch.

W = Safe load in tons.

D = 8 W.

$$W = \frac{D^2}{9}$$

## STOWAGE OF CARGOES.

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Q.—What precaution would you take while loading and discharging?

A.—Keep the ship upright and a few inches by the stern, so that the water may come to the pumps. Also, keep the cargo spread fore-and-aft lest it strain the ship. Try the pumps repeatedly. Every evening note the draught of water, and the tons weight taken in during the day.

Q.—What is the first duty of a mate entrusted to prepare the ship's hold to receive the cargo?

A.—I would sweep the hold clean, see the limbers clear fore-and-aft, so as to let the water have a free passage to the pump-well, pumps all right, and the dunnage properly stacked, all ready for laying as I wanted it.

Q.—What are limbers, and where are they situate?

A.—The limbers are square holes cut through the lower part of the ship's floor timbers, fore-and-aft, on each side of the keelson. They form a channel which communicates with the pumps throughout the whole length of the floor.

Q.—Where are a steamer's limbers.

A.—At the sides of the tanks.

Q.—What is dunnage, and what is it for?

A.—Loose wood or other substances laid at the bottom of a ship to prevent damage to the cargo if a ship should leak.

Q.—What places require special attention as regards dunnaging?

A.—The floors, bilges, around the masts and pump-well, in the wake of the chain-plates, scuppers, hooks, and transoms.

Q.—Why in the wake of the floor timbers?

A.—Because when a ship lies along she will have most water there.

Q.—Why in the wake of the chains?

A.—Because ships are apt to strain there owing to the weight of the masts and rigging when she lays along.

Q.—State the **general rule for dunnaging a ship**?

A.—Place *five* inches more dunnage in the bilge than on the floors; or, nine to ten inches on the floors, fifteen inches on the bilge, and three and a half in the wings.

Q.—How would you lay the dunnage on the floors?

A.—Lay the pieces on the floor as far apart as convenient, so as to leave a free run for the water.

Q.—How would you lay the '**tween deck dunnage** ?

A.—Athwartships, and the first tier not too close, but so as to allow a free passage to the scuppers of any water that may get on the inside lining of the vessel.

Q.—How would you lay the dunnage in the bilge ?

A.—It should be carried well up round the bilge, especially abreast the foremast, because when the ship heels over the water dashes up there.

Q.—State what **thickness of dunnage** you would lay in the 'tween decks for **cases**, what for **bales and bags** ?

A.—One and a half inch for cases, and two and a half inches for bags and bales.

Q.—Your ship will not stand without ballast, how would you dispose of it when taking in iron ?

A.—Trim the ballast to each end, leaving the 'midships clear, then commence taking in, stowing amidships; discharge the ballast and go on again.

Q.—What part of the cargo is considered as **dead weight** ?

A.—Iron, copper, lead, and other metals constitute dead weight, and is used to ballast the ship.

Q.—How should **dead weight be stowed** ?

A.—The dead weight if stowed altogether in the bottom of the ship would strain her. It should be stowed longitudinally from the fore to the after hatchways, taking care to raise it well up in the centre of the ship, and keeping both ends as clear from dead weight as possible; this will make the ship easier in a sea-way.

Q.—How would you **stow an entire cargo of iron** ?

A.—I would rig a platform to the height of three and a half feet, then commence stowing the iron by laying it fore-and-aft, between the fore part of the after hatch and the after part of the fore hatch, placing it diagonally or grating fashion, keeping the bars well apart (an inch or two). Carry it over into the wings, right up both sides, taking care to have bars along the sides to keep the chafe off the skin, and bringing it up from the ends slantingly, like steps, towards the main hatch. Secure the iron by driving down pegs between the bars, and tomming off from the beams with planks under the toms; or by laying the last three tiers solid, and shoring and wedging.

NOTE.—At Newport railway iron is stowed as follows:—Dunnage is laid to level the hold, two or three bars are then laid close together alongside the keelson, then a space of about six or eight inches, then other two or three bars, and so on till the bars are above the keelson, then grating fashion, and the upper tiers are solid and locked together.

Q.—How do you **raise the entire body of the iron** ?

A.—By stowing it grating fashion, and bringing it up in a slant from the ends towards the main hatch.

Q.—What is the object in raising the body of the iron?

A.—By so doing the violent rolling of the ship is prevented, and she is easier in a sea-way.

**NOTE.—To stow Bar Iron in Steamships.**—Lay the bars across the top of the tanks, so as to equalize the strain on the tanks, then stow diagonally, or grating fashion. If the engines are amidships, place bars alongside the tunnel and skin of the ship to prevent chafe, and stow grating fashion on each side until a few inches above the tunnel, then make lock tiers across the tunnel, after which stow grating fashion—strips of wood being placed on each tier to prevent shifting. Finally, tom off from the beams with planks under the toms.

Q.—You have a **quantity of iron**, say 200 tons, to take in, how would you stow it?

A.—Stow it in the body of the ship fore-and-aft each side of the keelson, until level with it, then diagonally, *but not bring it up to a point*.

**NOTE.**—Small quantities of iron may be stowed solid, to give the ship stability.

Q.—You are taking railway iron in from the quay and from a barge, the bars are all rested, how would you stow them so as to know one lot from another when discharging?

A.—After one lot is in lay a piece of spunyarn across to divide it from the other lot.

Q.—If you have **bale goods to go on the top of the iron**, what precaution would you take?

A.—Place an inch or an inch and a half of planking or good dunnage wood over the iron to keep off the chafe.

Q.—You are in a **steamer loading railway iron**, how do you protect the tunnel?

A.—By laying rails on it, fore-and-aft, or by covering it with coals or dunnage.

Q.—Where would you commence to **stow casks**?

A.—In the 'midships, and stow towards the wings.

**NOTE.**—In a steamer commence from the bulkhead.

Q.—When would you **stow casks from wing to wing**?

A.—When by doing so I can get another cask in the tier.

Q.—How can you get another cask in the tier?

A.—By commencing in the wings and stowing right across, the broken stowage of the wings caused by stowing amidships first is avoided.

Q.—What is the **best method of stowing casks**?

A.—Place them exactly fore-and-aft, bilge and cuntline, "bung up and bilge free," well quoined, with three inches of soft wood beds, and not trust to hanging beds.

All liquids should be stowed bilge and cuntline for two reasons: 1. When stowed in that way they are much safer, in fact they almost stow themselves. 2. Because you only require the size of the head of the cask to stow each tier, thus economizing space. Plenty of quoins should be used in stowing casks. The bilges should be free, not only from underneath, but from the cask, also on either side; they must be

stowed close until the longer is completed, and then wedge off by driving quoins on each upper quarter. If the casks are not exactly in a fore-and-aft line, the chimes will crack and get broken in breaking them out of their places. The space between casks should be filled up just high enough for the beds to rest upon, that the strain from the upper heights may not fall entirely upon the lower casks.

Q.—Where do you commence to stow casks in a steamer?

A.—From the bulkhead.

Q.—Why are casks stowed bung up?

A.—To prevent leak, and because it is the strongest way of the cask; the head pieces are put in so that they are up and down when the cask is bung up.

(Flour barrels, &c., should be stowed with their head pieces vertically).

Q.—How do you keep the bilge free?

A.—By the beds.

Q.—Where do you place the quoins, and what are they for?

A.—On the beds on each side of the cask to prevent it rolling.

Q.—How can you tell if a cask is bung up, if it is dark, and if you cannot find the bung?

A.—By the rivets on the hoops, which are always on top by the bung.

The bung is between the rivets of two opposite hoops.

Q.—How many **hoops** are there generally on **each side** of a cask, and what are their names?

A.—Four; two chime hoops, a quarter hoop, and a bilge hoop.

Q.—What is the bilge of a cask?

A.—The largest circumference.

Q.—The chime of a cask?

A.—The projection of staves beyond the head.

Q.—Supposing you had to stow a whole cargo of beer in hogsheads, how would you form the lower tier?

A.—Bung up and bilge free of floor and keelson, and well quoined. Begin amidships and stow towards the ends till one longer is finished, then stow towards the wings. The bilges of the second longer from the keelson in line with the bilges of the first longer.

Q.—How would you block off the ground tier in the wings?

A.—By dunnage wood, keeping the bilges free at the wings.

Q.—How would you stow the riding tier?

A.—In the cuntlines of the lower tier.

Q.—How would you secure the riding tier?

A.—By four quoins at the quarters of the casks.

Q.—How would you stow a single pipe of wine?

A.—Fore-and-aft, with bung up and bilge free, well quoined, with three inches of soft wood bed under the quarter.

Q.—How many heights of casks are you allowed to stow?

A.—*Three* heights of pipes or butts, *four* heights of puncheons, and *six* heights of hogsheads.

Q.—How many heights of beef tierces and flour barrels?

A.—*Six* of tierces and *eight* of barrels.

Q.—How many gallons are there in a pipe, a puncheon, a hogshead, and a tun?

A.—In a pipe there are one hundred and twenty-six gallons, in a puncheon eighty-four gallons, in a hogshead sixty-three gallons, and in a tun two hundred and fifty-two gallons.

Q.—Your ground tier of puncheons is stowed and you find one of them is damaged, how would you break it out?

A.—By parbuckling it out.

Q.—Where would you make your ropes fast, supposing there were no stanchions or knees near?

A.—Toggle the ropes under the ropes of another cask.

Q.—What would you do to help the parbuckle over the upper tier?

A.—Place a skid on a slant, so that a cask may roll up it.

Q.—The hold is nearly full with cargo at each end, and some hogsheads of beer are to be stowed, state how you would lay the ground tier?

A.—Bilge and bilge.

Q.—How would you stow the casks in the second tier?

A.—In the cuntlines of the lower tier.

Q.—On how many casks does each cask of the second tier rest?

A.—Four.

Q.—What do you understand by **light freight**?

A.—All packages, bales, and casks not weighing more than twenty-five hundred-weight to the cubic ton measurement.

Q.—Where and how would you stow **bale goods, cotton wool, &c.?**

A.—In the after hold or amidships on their *flats*, marks and numbers uppermost, and on their *edges* with their flat to the side in the wings, marks inward.

Q.—Why the wing bales on their edges?

A.—So that in case of leakage only a part of the bale would be damaged, and not the edges of each piece of the bale.

Q.—Why have the *marks* inward?

A.—Because if the marks were against the ship's side any leakage occurring they may be washed out or destroyed.

Q.—What purchase would you use when taking in bales of about 2 cwt. each?

A.—A single Spanish burton.

Q.—Suppose you have an **entire cargo of bale goods** to stow, how would you commence?

A.—Stow the first bale alongside the keelson, directly under the main hatch, in front of the pump-well, mark and number uppermost. The second bale on the opposite side of the keelson. The third alongside the first, and the fourth alongside the second, and so on towards the wings, fore-and-aft.

Q.—How should **cases** be stowed?

A.—The top of the case, which is known by the *mark* and *number*, must be stowed uppermost.

Q.—State the preparations to be made for taking in a cotton cargo?

A.—It will be necessary to ballast the ship, allowing, say, about twenty-seven tons of ballast to every hundred tons of cotton, or a still larger proportion of ballast will be better. The ship being already in ballast, it may be disposed of by laying it in the floor, and carrying it into the bilges under the dunnage. Leave some out for filling up the broken stowage in the ground tier.

Q.—Where does the broken stowage occur?

A.—In the bilges, around the masts, pump casing, stanchions, breast hooks, transoms, and in the top of the keelson.

Q.—What dunnage do you allow for a cargo of cotton?

A.—The dunnage should be at least nine inches on the floor and to the upper part of the bilge; the wing bales of the second tier to be kept six inches off the side at the lower corner, and two and a half inches in at the sides. A sharp-bottomed ship I would allow one-third less dunnage in the floor and bilges.

Q.—The hold is full amidships with bale goods, and a number of casks have to be stowed, how would you commence?

A.—Place the first cask on the fore side of the bales, close to the keelson, bilge free from floor and keelson.

Q.—Is there any precaution you should take while loading sugar in casks?

A.—Yes; molasses are apt to leak out of the casks, and if neglected they will choke the pumps. Try the pumps repeatedly.

NOTE.—**Molasses.**—Should the cargo consist wholly of molasses it is advisable to commence the stowage amidships, alongside the pump-well, working towards each end so as to have the breakage fore-and-aft. Do not take in over four heights, stow the casks bilge and cuntline, bung up and bilge free, with good beds well quoined off under the quarter. Have a vent-hole at the side of the bung of each cask, otherwise the cask may burst from the fermentation during the voyage.

Q.—You are about to load tar. Is there any particular precaution you should take?

A.—The flat of the ceiling and to the upper part of the bilges should be caulked, the limber boards taken out, and a three inch deal laid over the space and fastened to the limber strake. Spirits of tar should be provided to pour down the pumps in case they are likely to choke.

Small round-mouthed scrapers with long handles, to scrape the insides of the pumps, should be got. No sand ballast should be left in the ship. The pumps should be tried repeatedly.

Q.—You have an entire cargo of pitch to stow, what would you be particular about?

A.—To stow the casks bung up.

Q.—Where would you stow oil, resin, tar, &c.?

A.—In the fore peak.

NOTE 1.—Tar, resin, &c., must be stowed underneath and clear of all fine goods.

NOTE 2.—**Petroleum.**—In some parts it is customary to stow petroleum bilge and bilge, an exceedingly dangerous practice; and, further, having as a consequence to carry a much larger proportion of dunnage, the ship cannot take anything like the quantity of cargo she ought to.

Q.—Suppose your fore main hold is clear, and you have a quantity of rice to take in, where would you commence to stow, and how?

A.—Begin at the main hatch and stow forward. First tier from keelson to wings; tiers above the keelson, from wing to wing.

Q.—How do you stow machinery?

A.—The heavy parts first in amidships, chocking and securing them well.

Q.—What dunnage would you place for nail rod iron?

A.—Ten inches on the floor, fifteen on the bilge, and three and a half in the sides.

Q.—You have, say, 500 casks of molasses and a quantity of coffee, rice, or linseed, how would you stow them?

A.—Half the casks of molasses at each end, the coffee, rice or linseed in the middle.

Q.—Suppose you have 200 tons of molasses, 400 tons of rice, 400 of sugar, and 200 of saltpetre, how would you stow them?

A.—Stow the molasses at each end, rice in the fore hold, sugar in the main hold, and saltpetre in the after hold.

Q.—State your reason for stowing them so?

A.—The saltpetre is placed in the after hold to trim the ship, sugar in the main hold so that the steam from it could not penetrate the cabin.

Q.—Lay dunnage for tea?

A.—Small dry stones are taken in for ballast, and they are used for dunnage; they are levelled fore-and-aft, and laid to correspond with the shape of the beams athwartship.

Q.—In laying ballast for a cargo of tea what precaution would you take to prevent broken stowage?

A.—To measure from ballast to beams.

Q.—If sand ballast, gravel, rattans, brushwood, firewood, &c., are used for dunnage, how should they be laid?

A.—Sand, ballast, gravel, or anything that will damage the cargo ought to be covered with boards. Rattans, firewood, &c., should be laid no closer than is necessary to support the cargo, so that there may be room for water, if any got on the ceiling.

Avoid horn shavings as dunnage from Calcutta.

Q.—State the stowage of general cargo ?

A.—Select the strongest casks, such as tallow, beer, &c., for the ground tier, reserving wines, spirits, molasses, oils, &c., for the second or third tier, in order to reduce the pressure. All dry goods, if possible, in the after part of the ship; iron amidships; pitch, resin, and tar in the fore peak; rough goods not liable to be injured by water in the other parts of the ship.

Special attention should be directed to prevent dry goods, in bags or bales, being placed near goods liable to leak, or to moist goods, as, for example, bales of bacon, salted hides, butter, &c. When iron forms part of the cargo, place a dunnage of three and a half inches (deals) over it for bale goods in order to keep off the chafe of the iron.

Q.—You are loading a general cargo consisting partly of rough and hard goods, such as coals, grindstones, metals, bundles of sheet iron, iron rods, pipes of copper or iron, &c., and partly of goods in bags or bales which are liable to be chafed or damaged by contact with rough goods; how would you stow the goods ?

A.—Place the rough goods, in general, underneath and forward of the fine ones, and separate from them by boards or dunnage.

Q.—How would you stow goods, such as glass, bottles, earthenware, &c.?

A.—In a place by themselves, with plenty of straw.

Q.—There is a cask, bale, or package in the hold damaged, what will you do with it ?

A.—I will not move it until I call the master's attention to it. It may be necessary to have a survey upon it.

Q.—How would you stow goods liable to damage from leakage of the casks ?

A.—Keep the goods liable to damage above the casks, or forward or aft of them.

Q.—In loading timber, where do you stow the heaviest ?

A.—At the bottom of the ship.

Q.—You are taking mast pieces in ?

A.—Take them in with a strop, and pinch them with handspikes. If dogs and crowbars are used they will damage the masts.

Q.—You are taking in very long mast pieces for Chinese junks at Singapore. You have only one bow port.

A.—It may be necessary to lift the foremast in order to get some of the long spars to the other side of the ship.

Q.—What general direction does the air between the decks take ?

A.—It takes the opposite direction to that of the wind. The more the ship is battened down the more sure is this the rule.

Q.—You are loading coals for a distant port. There is gas from the coals?

A.—They should, if possible, be lowered into the hold to prevent breakage, which conduces to heating; it must be stowed solid, without through ventilation, but ample surface ventilation must be provided by means of ventilators fixed in the deck in such a manner that they can be kept open at all times.

To prevent fire or explosion during the voyage, the surface ventilators must be carefully attended to at all times, and the hatches kept open whenever it is possible. A thermometer should be fixed in the hold out of draught, and a record kept of its reading at regular intervals; this will indicate if the cargo is heating.

Q.—Where should ventilators be put?

A.—There should be two, one forward and one aft, for each hold.

Q.—Which would be the uptake?

A.—The weather one for the time being.

Q.—Are the ventilators protected?

A.—Yes, with cowls.

Q.—How do you stow pig iron?

A.—Cross bar and solid forward and aft and in the sides, solid amidships, and brought up to the main hatch.

Q.—How would you stow lead?

A.—If pig lead only is taken, dunnage with coal and rubbish until the keelson is completely covered, in order to keep the lead well up, and make the ship easy in a sea-way. Next lap planks, and stow in the middle in stacks, placing the pigs three or four inches apart, and crossing at the same distance.

Q.—How would you stow copper, iron, or lead ore?

A.—Build up a trunk in the middle of the hold to keep the ore from shifting. If the ship is not already adapted to the trade by having a trunk built up, raise the cargo will up, and bring it towards the main hatchway ; keep the ends of the ship clear.

Q.—How would you stow grindstones, cog-wheels, or plate glass?

A.—On their edges.

Q.—You have coarse and fine sugar to stow, which would you take in first?

A.—The coarse sugar.

Q.—Where would you stow provisions?

A.—In the after hold.

Q.—Suppose your cargo to consist of saltpetre, sugar, linseed, &c., what precaution would you take, and which would you stow first?

A.—Be particular to keep the different articles separate from each other; stow saltpetre first.

Q.—What do you place over saltpetre ?

A.—Place planks and matting over it.

Q.—If the cargo to be stowed consists of machinery and liquids in casks, where would you stow each ?

A.—The machinery amidships, and the casks towards the ends of the vessel.

Q.—Where would you stow bullion ?

A.—In the bullion room under the cabin deck.

Q.—You are in a steamer which is loading a general cargo for different ports ; how would you stow the goods ?

A.—Keep the goods intended for the first port uppermost, if possible, and so that the ship will be on a trim when they are taken out. Note what hold, and what part of the hold, each merchant's goods are in.

Q.—How would you stow saltpetre ?

A.—Raise it on a platform not less than three feet from the skin ; take it no further forward than the foremast, no further aft than the mizzen-mast ; keep the ends of the ship free ; after laying the lower tier lay every bag of the second tier so that it rests on half of each bag below it, and so on with every tier ; diminish every tier so that the cargo slopes towards the main hatch.

Q.—Suppose your cargo were bags of coffee or cocoa, what dunnage would you lay ?

A.—Nine inches in the floors, fourteen to the upper part of bilge, and two and a half at sides.

Q.—Suppose the cargo were guano, state what preparations should be made, and what dunnage would you allow ?

A.—Dunnage of fifteen to twenty inches, or even as much as two feet, for the purpose of making the cargo more secure and the ship easier in a sea-way ; or stow it on a platform similar to that used for copper ore ; or dunnage well, say, as far up as the keelson ; then place, say, two tiers of bags fore-and-aft so as to prevent any air from being drawn through by the suction of the pumps, or the powder or loose guano from finding its way between them. Dunnage the ship's sides not less than three inches, and carry a tier of bags up to the lower beams.

Q.—You are loading grain in bulk ?

A.—Do not allow it to come in too fast. Pour it through a canvas hose to prevent dust from arising as much as possible. Watch that the grain does not get under the mats. If necessary, trample it well. Be very careful that it is well trimmed under the beams, stringers, and decks.

Q.—How much grain can you take in bulk in New York ?

A.—No vessel exceeding 400 tons register can be loaded with grain in bulk. Exceeding 400 tons and not over 500 tons, two-thirds in bulk and one-third in bags. Over 500 tons, half in bulk and half in bags.

Q.—You are loading grain in bulk, your ship has 'twixt decks laid, would you have shifting boards below them?

A.—Yes; grain is as liable to shift there as above.

Q.—What dunnage do you allow for grain?

A.—Not less than ten inches in the floor and fourteen to fifteen inches at the bilge. When lined, a water course between it and the side.

Q.—How would you lay mats in the hold for a cargo of grain?

A.—Mat from the keelson upwards to the bilge, so that each overlaps the other, and prevents the loose grain from mixing with the dunnage.

Q.—Where would you commence to mat your ship for a grain cargo?

A.—Begin in the 'midships both in floor and sides, and work forward and aft, overlap one-third. Put double mats on the dunnage round the mast casings and pump-well. Single mats on the sides.

Q.—What precaution do you take with the pumps when about to take in grain?

A.—Fit them close through the ceiling so that no grain can get to them if an accident happens to the pump-well. Also, have a clear trunk way to their bottoms.

Q.—What further precautions would you take with a grain cargo?

A.—Build strong bulkheads to form peaks at the ends of the ship. Fix strong shifting boards, well secured. Have feeders and ventilators. If loading at the United States or Canada the ship must be lined, and loose grain must be stowed in bins not to contain more than 12,000 bushels each.

Q.—When will the new law on the "Carriage of Grain" apply to your ship?

A.—When loading grain in the Black Sea or the Mediterranean and bound outside the Straits of Gibraltar; or, if loading grain in the United States or Canada.

Q.—What grain may be carried between the decks?

A.—Between the decks, or, if the ship has more than two decks, between the main and upper decks, only such grain in bulk as may be necessary for feeding the cargo in the hold, and this grain must be carried in properly constructed feeders.

Q.—What rule is laid down for ships that have not properly constructed feeders?

A.—That *not less* than one-fourth of the grain carried in the hold or compartment (as the case may be) *shall be in bags*, supported on suitable platforms laid upon the grain in bulk.

Q.—There are certain exceptions to this. State them?

A.—1. To oats or cotton seed.

2. To sailing ships of less than 400 tons register tonnage, if not engaged in the Atlantic trade.

3. To a ship in the Mediterranean or Black Sea, if the ship is divided into compartments by substantial transverse partitions, and is fitted with longitudinal bulkheads, or proper shifting boards, and if she does not carry more than 1500 quarters in any one compartment or division, and that each division of the lower hold is fitted with properly constructed feeders from the 'tween decks.

4. If the grain is only one-half of the whole cargo, the rest being cotton, wool, &c., or other suitable cargo, so stowed as to prevent the grain shifting.

Q.—Must shifting boards be used?

A.—Yes; whether the grain is in bulk or in bags, unless you have a properly constructed longitudinal bulkhead.

Q.—Where are those shifting boards to be placed?

A.—From deck to deck, or from deck to the keelson, fore-and-aft, and must be properly secured; and, if the grain is in bulk, must be fitted grain-tight, with proper fittings between the beams.

Q.—What kind of boards should they be?

A.—Three-inch deals.

Q.—How are these shifting boards secured?

A.—Some ships have single stanchions, with a hook for the boards to fit into; but in most cases the stanchions are double, and the boards between them.

Q.—What are the three things to be seen to in loading grain?

A.—That it is properly stowed, trimmed, and secured.

Q.—Having discharged all your cargo, proceed to clear up and make ready for a general cargo?

A.—Sling spars to the stanchions and stow the dunnage wood upon them, then sweep up.

Q.—Suppose you are in a foreign port, and you have to commence to take in your return cargo, what precautions would you take?

A.—To make sure that the limbers are clear.

Q.—What is meant by baulking a ship?

A.—Keeping the ends free from cargo.

Q.—What proportion of a ship's cargo ought to be in the lower hold?

A.—Two-thirds.

Q.—How many tarpaulins are you required to cover the hatches with?

A.—Not less than two.

Q.—Who is responsible for the stowage of the cargo?

A.—The Master.

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## MAKING AND TAKING IN SAIL, &c.

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### *Examples in Managing Sails.*

In taking in a sail endeavour to get the wind out of, or spill it, for the more wind it holds the more difficult it will be to manage.

With the *lee sheet* let go a sail will be emptied of wind, but if blowing hard it would soon be rent in pieces; therefore, in taking in a sail when blowing fresh, always ease the lee sheet so as to take the strain off the yard, but not sufficient to shake the sail.

With the *weather sheet* let go the wind remains in the sail and keeps it steady, but in the case of a large sail, such as a course, if the tack is let go suddenly it would be very liable to spring the lower yard.

*If a studdingsail tack requires to be hauled out,* the wind is made to help by keeping the ship away.

*In hauling out a spanker out-haul* the wind is made to help by easing the boom well over on the quarter.

*In taking in a spanker ortrysail* the wind is got out of the sail by hauling up the lee brails first.

**NOTE.**—Take care that the sail does not get over the lee cross-jack yard-arm. To prevent it doing so the yard must sometimes be braced-to.

*In taking in a topgallantsail or royal* the wind is got out of the sail by letting go the lee sheet first.

*To get a yard down.*—Let go the lee sheet, haul in upon the weather brace, and haul down upon the clewlines, keeping the weather sheet fast.

*In taking in a jib.*—By letting go the halyards the wind is got out of the upper part of the sail, and it runs down two-thirds the stay of itself; then, by starting the sheet, the sail is hauled down without straining the stay or boom.

*In furling a jib* the wind is got out of the sail by letting go the sheet gathering the foot of the sail on the boom, passing it along from the tack.

*In taking in a course* the wind is got out of the sail by hauling up the buntlines and leechlines more than the clewgarnets.

*In taking in a course, or topsail, blowing hard.*—Such large sails will not stand being shaken, therefore the wind is kept out only as much as prudent, and the sail taken in by starting the lee sheet *a little*, hauling up the weather gear first, and then the lee gear. If it is required to relieve the ship quickly, the lee-sheet must be let go, even at the expense of the sail.

NOTE.—In taking in a course, blowing hard, the chief danger is that when the tack is let go, the lower yardarm, having lost its downward support, is sprung by the great strain of the topsail-sheet buckling it upwards. The yard should therefore be properly secured, and particularly so before taking the sail in.

“ Man the clew-garnets ! ” “ Let the main sheet fly ! ”

It rends in thousand shivering threads on high.

The mainsail, all in streaming ruins tore,  
Loud fluttering, imitates the thunders roar.

\* \* \* \* \*

The watchful seaman, whose sagacious eye  
On sure experience may with truth rely,  
Who from the reigning cause foretells the effect,  
This barb'rous practice ever will regret;  
For fluttering loose in air, the rigid sail  
Soon flits to ruins in the furious gale;

AND HE WHO STRIVES THE TEMPEST TO DISARM  
WILL NEVER FIRST EMBRAIL THE LEE-YARDARM.

FALCONER'S *Shipwreck*.

NOTE 2.—Opinions are very much divided about taking in sails when blowing hard. The hauling up the lee or weather clew of the sail first, is a point on which our best seamen differ. A first-rate seaman, and a captain in the Royal Navy, gives the following as his reasons for taking in a square sail by the wind, when blowing hard, by hauling the lee-clew of the sail up first:—“ Let me first presume, in answer to your queries, that the *lee sheet* and weather brace command all square sails. By easing off the lee sheet the sail is neutralised, spilled, and rendered more manageable; likewise the weather brace is relieved of the strain, which is not the case with the lee sheet kept fast and tack let go. In taking in a topsail, I therefore ease off the lee sheet so far as not to shake the sail, and haul up the lee clewline and buntline; then ease off the weather sheet, and clew all up, attending to the weather brace to humour the sail; by this means the sail is taken in with scarcely a shake, and the lee clewline and buntline being well up before the weather sheet is started; keep the sail more to windward, and as far as possible prevent it from being *blown through the bunlines*, which invariably happens if the weather clewline and buntline are hauled up first. I take a course in the same way; if the topsail is set over the course, you have not such a command over the weather brace, lest the topsail should be brought aback, but the lee clew being well up, and a good hold of the sail with the lee buntline and leechline, ease away and tack, and haul up together. If the topsail is not set, humour the sail with the weather brace, as in the case of topsail or topgallant-sail. It is always reckoned bad seamanship, in a gale, to start a tack with the lee sheet hauled aft. I saw a line-of-battle-ship's main-yard sprung from the main-tack giving way when under reefed courses. I presume the same thing would have happened had it been let go. It has always been an object with me to have the sail manageable after it is clewed up, as well as the safety of the canvas in clewing up. You must have often seen the trouble and annoyance in furling a wet mainsail that has been allowed to blow through the bunlines. In hauling the weather clew first up without easing the lee sheet, the whole pressure of the wind is still on the sail, and nothing can be done with the weather brace until the sheet is eased off, and the mischief of blowing the sail to pieces has taken place.

#### Q.—How would you **set a foresail ?**

A.—Loose the sail and overhaul the bunlines and leechlines. Let go the clew-garnets and overhaul them, and haul down on the sheets and tacks. If the ship is close-hauled, I would ease off the lee-braces, slack the weather-lift and clew-garnet, and get the tack well down. When the tack is well down, sharpen the yards up again by the brace, top it well up by the lift, haul aft the sheet, and then haul out the bowline.

Q.—State how you would **take a mainsail in ?**

A.—I would man the weather clew-garnets and buntline, ease off the main-sheet a fathom or two, and belay ; I would then slack away the main-tack, and haul up the weather clew-garnet and buntlines, taking care to have the sail kept full. When the weather-clew is up, and as much of the buntline as can be got, then luff the vessel as close to the wind as possible ; ease away the main-sheet, and haul the lee clew-garnet up, and buntlines at the same time. I would haul a foresail up in the same manner.

Q.—You have been carrying your mainsail a long time, and it blows very hard, your gear is not sufficient to haul it up snug, what extra gear would you use ?

A.—I would use spilling lines.

Q.—How would you rig them ?

A.—Seize a block well out on the yard arm, reeve the line through the spilling block down before the sail, bring the end up abaft, and make it fast to the yard.

Q.—How would you **clew a topsail up in a gale of wind ?**

A.—I would slack away the weather-sheet, and haul the weather-clewing close up, and the buntlines as much as possible, then man the weather-brace, let go the lee one, and, as I start the lee-sheet, I would haul in upon the weather-brace, and haul up the lee-clewing and buntline.

Q.—You want to get the main-topsail sheets close home ; which sheet would you clasp the luff on first ?

A.—Always get the lee sheet home first, and, if necessary, give the vessel a luff up, and get the weather sheet home while the sail is lifting.

Q.—In **setting a topgallantsail** which **sheet** will you **haul home first ?**

A.—I would haul the lee-sheet home first, the weather-sheet may be easily got home by keeping the sail shaking.

Q.—How would you set a main-topgallantsail ?

A.—Loose the lee side first, then the weather side, let go, and overhaul the buntline and lee-clewing. Haul home the lee-sheet then the weather-sheet. Let go the lee brace, hoist away on the halyards, slack the weather brace as the yard goes up, trim the yard.

Q.—Running with the wind right aft and setting the main-topgallant-sail ; the sheets cannot be got close home, what would you do ?

A.—Hoist a little on the halyards to clear the foot of the sail off the stay, and light the gear up.

Q.—The starboard sheet is close home, but the port sheet is, say, two feet off ; a man is at the yard-arm to light it out, how would you assist him ?

A.—By hauling in the port brace.

Q.—How would you **take in a topgallantsail ?**

A.—Having let go the halyards, I would haul in the weather brace to spill the sail ; haul up the lee-clewing and buntline, then the weather gear, and stow the sail.

Q.—The mainsail being set and you require to brace up the main-yard, what gear would you let go?

A.—The weather brace and lee lift.

Q.—How would you **bend a course in blowing weather?**

A.—I would stretch the head of the sail across the deck as near as possible; bend the gear, then bring the leeches of the sail as near where it should haul up on the yard as I can; then stop my sails well about every two or three feet; besides the yard buntlines, have one in 'midships of the sails. When ready, man altogether, and run it up to the yard; then the sail may be bent and furled with very little difficulty.

Q.—You are **sending your fore-yard aloft at sea**, and the **ship is rolling**, what precaution would you take to prevent the yard from flying about?

A.—Get a gun-tackle purchase on the forestay, which will steady the yard when going up, and keep it clear of the mast while trussing it.

Q.—How would you set a topmast-studdingsail?

A.—Haul well taut the weather fore-lift and make it fast, steady taut the boom burton and boom brace, and belay. Bend on the halyards one-third from the inner yard-arm; bend on the tack and make the down-haul up.

Q.—How many sheets would you put to a topmast-studdingsail?

A.—Two.

Q.—What is the second sheet for?

A.—A yard sheet, which would be either rove through a block or through thimbles at the yard-arm, so that in case the halyards gave way it would be the means of saving both sail and boom.

Q.—What is the best and quickest bend for studdingsail halyards?

A.—A strop sliding on the halyards which has a stopper knot on the end—the halyards are taken round the after side of the yard, and the knot toggled into the strop which is on the fore side between the yard and the sail.

Q.—What is the **advantage of a studdingsail bend?**

A.—The advantage is that it lies close to the yard, and consequently permits little or no drift between the yard and blocks.

A strop to go two-thirds round the yard—a small iron toggle spliced into the end of the halyards—the halyards rove through the length of the strop and toggle—is equally secure and far more convenient for bending and unbending, which you must do every time you take in the sail.

Q.—How is the **heel lashing of a topmast and topgallant-studdingsail-boom secured?**

A.—That of a topmast-studdingsail-boom is secured round the quarter iron; of a topgallant-studdingsail-boom, through the quarter strop and round the jackstay.

Q.—State how you **secure the fore-topmast-studdingsail-boom**, and state how far out on the studdingsail-yard you will bend your studdingsail halyards, and why? What bend do you make? Also, state a good prevention, blowing fresh, against a topmast-studdingsail blowing before all, in setting the sail?

A.—Haul taut the boom brace and topping lift. I would bend the halyards eight or nine inches outside the middle of the yard, so as to keep the outer leech taut.

Q.—As soon as the topmast-studdingsail is set, what is done with the down-haul?

A.—The down-haul and deck sheet are hauled up abaft the yard and sent down outside, before all on deck ready for taking the sail in.

Q.—In shifting a topmast-studdingsail-boom, what is the first thing you would do when the sail is down on the deck?

A.—Shift the down-haul.

**NOTE.**—When taking in a lower studdingsail, if the wind should be fresh, the operation may be made easier by giving the ship enough weather helm to touch the inner leech. If the lower boom should get under the bow, unbend the halyards from the yard and bend them on to the boom as far out as possible, then sway up on them and the topping lift, haul in the after guy, and, if necessary, keep the ship off.

When taking in a topgallant-studdingsail always ease off the tack before starting the halyards, to spill the sail, when it may be hauled down by the sheet without difficulty.

Q.—You are going along with your topmast-studdingsail set, how will you keep the boom from rising?

A.—Toggle the lower halyards above the boom.

Q.—In setting a topmast or topgallant-studdingsail, which is done first, the tack hauled out or the halyards pulled taut up?

A.—The tack is hauled out first, as the sail then holding less wind brings less strain on the boom.

Q.—If you want to get a pull of a topmast or topgallant-studdingsail tack after the sail is set, how is done?

A.—Lower the halyards a little, then haul out the tack, checking the sheet, and hoist away again; or keep the ship away.

Q.—If the lower studdingsail boom gets forward under the bows, how is it brought aft again?

A.—Knot the lower halyards and tack together, run the knot out to the boom end, take a turn with the tack, haul taut the boom brace, and pull up the lower halyards, and as it comes out from the bow the topping lift and after guy.

Q.—Before setting studdingsails are the topmast-studdingsail halyards and tack before or abaft the lower halyards?

A.—Before, or else the topmast-studdingsail would be set abaft the lower halyards.

Q.—Close-hauled on a wind, how would you proceed to haul the jib down?

A.—Put the helm up and keep the ship off two or three points. Man the down-haul. Let go the halyards. Ease off the sheet. Haul the sail close down on the booms. When stowed, and the men off the boom, bring the ship to the wind again.

**NOTE.**—When taking in the jib, if it be blowing fresh, the sheet should be started just enough to keep the tacks from binding against the stay.

Q.—How would you send out a jib?

A.—Make it up on the luff tack down and head up, take a turn with the down-haul round the sail, hook on the halyards, and haul out the sail to windward of the boom.

Q.—How would you **reef a course**?

A.—Haul up and spill the sail as if you were going to furl it; then haul out the reef tackles, and reef it.

Q.—How would you **reef the topsails**?

A.—Lower away the halyards, haul in the weather brace until the sail shivers, take in the slack of the reef-tackles as the yard comes down, to keep the earrings clear haul the weather reef-tackle out first, then the lee reef-tackle and buntlines, then lay up and reef the sail; attend as the yard goes up to ease off the weather brace; when the sail is set haul in the lee brace.

When the yard is trimmed to the wind for reefing, the helmsman should be told to fancy himself at the weather earring, so that he may keep the sail properly lifting. When the wind is on the quarter much time is often lost in trying to haul out the reef-tackles without rounding in the weather main brace so far as to shake the mainsail. When the weather topsail brace only is checked with a reefed sail, the leech soon becomes taut, and so causes much difficulty in getting out the reef-tackles; and even when this is done, it usually takes a long time to reef the sail. Sometimes the mainsail has to be kept shaking, and, not unfrequently, hauled up altogether. It is very singular that there is usually so much unwillingness to start the topsail sheets, as, by doing so, the mainsail can be kept properly full; and it will be found in practice (in blowing weather) that the operation of double or close reefing will be much accelerated by clewing up at once. When the wind is on the quarter the topsail sheets, from their weight (being usually chain) and the reduced size of a reefed sail, will come home very easily, much more so than will the main tack and sheet, and starting them will ensure a safe and speedy mode of having a well reefed sail.

Q.—Blowing hard, the wind two points abeam, you want two reefs in the topsails, which topsail would you reef first?

A.—I should keep the ship before the wind and reef the fore- topsail first.

Q.—How would you **close-reef the topsails**, going large, with a heavy sea on?

A.—Put the ship dead before the wind, clew down the fore- topsail-yard, and lay it and the fore-yard square; haul out the reef-tackles; haul up the buntlines and reef the sail while becalmed by the main- topsail; when the fore- topsail is reefed, let go the gear and hoist it up; then brace up the main and main- topsail- yard (two good hands at the helm and look out she does not broach-to as the main- yard goes forward), then one watch haul taut the weather braces, the other, man the *lee reef-tackle* and buntline, and stand by to haul out when the sail shivers; when the gear is manned put the helm up, and bring the wind a little on the other quarter so that the main- topsail is shivering by the *lee*; haul the reef-tackles well out, and bowse the buntlines taut up; and lay aloft and reef.

By laying the yards as above, the main- topsail will shiver with the wind two and a half points on the quarter—the sea following the ship and the headyards being

squared will make her steer; if you try to brace the main-topsail by, so as to shiver the weather-leech, you will have to bring the wind abeam, and the sea will fill the decks and probably sweep everything off them—besides, the foresail is whole and it would not stand. If you clew the sail up, and brace the yard by, you could then reef it, but you give your crew extra work, and run the risk of splitting the sail, either in clewing up or in setting.

Q.—When **close-reefing your main-topsail** and running before a **heavy gale of wind**, what would you take into consideration?

A.—Bring the wind on the quarter, and take into consideration the way the sea was running.

Q.—How would you **close-reef a topsail, by the wind**, when the course is set?

A.—Clew the sail snugly up, haul out the reef-tackles, brace the yard by, and reef; then fill the yard and set the sail.

If you start the sheets only the sail is like a balloon, and you endanger the men on the yards.

Q.—**In bending and unbending a topsail**, what ropes are bent and unbent?

A.—Buntlines, clewlines, sheets, and reef-tackles.

Q.—Suppose you are under **double-reefed topsails, jib, and spanker**, and you split your main-topsail, proceed to shift it; state how you will gather the sail in, furl it, and pass your sea gaskets round; state, also, how you will send the old sail down: what ropes are to be used?

A.—Pass the gaskets round the sail to keep it quiet, then cast off the reef points, the robands, and the first and second reef-earrings at the yard-arms, and with them make the sail fast with a marline hitch from the yard-arm, in; cast off the standing part of the reef tackles, and put a knot in them; haul taut on deck, ready to slack away; unbend the buntlines and sheets, and with a spare earring lash the clew, head, and buntline cringle altogether, passing a turn or two round the sail; if the ship is by the wind and lying over, take a small rope out to the lee yard-arm, and bend in on the reef-tackle cringle to haul the sail up clear of the stay; then cast off the gaskets and earrings; slack away the lee reef-tackle; haul the sail to windward of the stay; cast off the 'midship stops; lower away the clewline; when clear of the top, lower away the weather reef-tackle and clewlines, and gather the sail in on deck.

Long buntline spans will here be found useful for passing round the bunt and through the clews. The sail may be sent down by a good gantline and weather reef tackle.

Q.—Get the **new sail up**; describe the bending, the gear, and reefing the sail; also state how you will make it up on deck to prevent wind getting into it?

A.—Reef by the foot, which is done in the following manner:—Stretch the close-reef of the sail taut along the deck; take the clews as near where they will haul up on the yard as I can; trace the clews

down clear to the foot of the sail; then haul the foot of the sail taut, without moving the clews out of their places, then gather the foot as near the close-reef as possible; then tie the close-reef round the foot; then the second reef, until all the reefs are expended round the foot of the sail—minding to keep the reef-knots as near at hand as possible, to be ready for casting off; by this means the sail may be bent without exposing more than one reef at a time, until the close-reef sail is set.

A topsail might be sent up by the buntline and weather clewline, or by a gantline.

Q.—How would you pass a reef earring of a topsail?

A.—I would pass the whole of the earring, except the close-reef down through the thimble in the reef strop, up through the reef cringle, over and under the yard, and up through the cringle again, to keep the sail up on the yard; but a close-reef earring I would pass up through the thimble in the reef-strop, down through the cringle, under and over the yard, and down through the cringle again, to keep the sail under the yard.

Q.—How would you reef the topsails, the wind about two points on the starboard quarter.

A.—Keep the vessel dead before the wind, and reef the foretopsail and set it. Then, keep the ship on her course, haul in the starboard main, and maintopsail-braces, and reef the maintopsail.

Q.—You are hove-to under a close-reefed maintopsail, and you want to shift it, how would you proceed to do so?

A.—Before starting anything set some after sail to keep the vessel to, such as the spanker, main-trysail, or mizzen-staysail; get another topsail on deck ready for bending, then clew up the topsail, cast off the reef points, and make them fast round the foot of the sail; unbend the gear, and send the sail down by a good gantline and the weather reef-tackle.

Q.—Proceed to bend another sail?

A.—Stretch the sail along the deck with the clews amidships, and reef it on the foot the same way as the other came down; send it aloft with the same gantline; haul out the reef tackles and first reef earrings, and tie the first reef points; then haul out the second reef earrings, and tie the second reef points, and so on until the sail is close-reefed.

NOTE.—Care should be taken to keep the head earrings clear, and to place the head rope of the sail close to the jackstay, so that in the event of the weather moderating, the head earrings might be hauled out and the sail bent to the jackstay without casting the reefs entirely adrift.

Q.—You are **sailing under double-reefed topsails**, and you want to **shake one reef out**, how will you proceed?

A.—I would settle the halyards a little, haul taut the reef-tackles and buntlines, then lay aloft and cast off the points, beginning from the bunts, tightening all the *first* reef points; then ease away the earrings together, taking care that the first earrings are secured.

Q.—Suppose you **split your foresail**, proceed to **shift it**; and state what precautions you will take to keep the sail from blowing to leeward in sending it down?

A.—Pass a few spare gaskets round the sail, and take the bights of the bowlines down to windward to haul in the sail with.

Q.—Brail up a **spanker in a squall**; what **braills** to be best manned, and why?

A.—In brailing up a trysail or driver, the lee braills should be manned best, and the slack only of the weather ones gathered in, so that the sail may be kept shaking.

Q.—What is **to be done with the cross-jack brace**, and why?

A.—The weather-brace must be eased a little lest the yard-arm should go through the spanker.

Q.—All plain sail set, the wind increasing, how would you begin to reduce the sails?

A.—First, take in the royals, flying-jib, and small staysails, and topgallantsails next.

Q.—The wind still increasing, what sails would you take in next?

A.—Take in the first, and afterwards the second, reef in each topsail, and stow the jib.

Q.—The wind still increasing, what will you do next?

A.—Close-reef the fore and mizzen topsails, reef the courses, and stow the mizzen.

Q.—An increasing gale, with a strong sea running, what would you do next?

A.—Reduce to two close-reefed topsails, and carry these as long as ship and masts will bear it without injury to either, in order to keep steerage way on the ship. The helm must be well attended to, easing it down to the pitching of the ship.

Q.—If the ship could not bear two close-reefed topsails, what would you do?

A.—Stow the fore-topsail, and afterwards the main one, and set a storm staysail, either on the main or mizzen.

Q.—The gale is at its height, a very heavy sea running, and the ship labouring very hard, could anything be done to ease her?

A.—Have the helm strictly attended to, and *not lashed to leeward*. By carefully watching the seas and the motion of the ship the vessel may be eased greatly when contending against a heavy sea.

Q.—Is there anything else can be done?

A.—Yes; lower down gaffs and booms, unreeve all steering sail gear and spare ropes, and send down royal and topgallant-yards.

Q.—In sending yards down at sea, which side is the yard rope stopped out?

A.—The lee side.

Q.—What side does the yard come down?

A.—The weather side, and through the lubber's hole.

Q.—The ship being on the port tack and rolling heavily, how do you send down a royal yard?

A.—Reeve the yard rope, bend it on the slings of the yard, put a quarter stop on about two or three feet from the slings, and bend a tripping line on to the port yard-arm. All being ready, unparral the yard, sway away, take off the port lift and brace, lower away the yard rope, take off the starboard lift and brace, lower the yard down on deck,

Q.—Send down a topgallant-yard, blowing hard?

A.—Unshackle the halyards and unreeve them, reeve a yard rope through the sheave-hole at the mast-head. Bend it on to the quarter of the yard and sway away till high enough to get the lifts off. Unparral the yard, stop the yard rope to the yard-arm, and bend on a tripping line to the weather yard-arm, unhook the braces and lower away.

Q.—Send down a topsail-yard, blowing hard?

A.—Proceed as with a topgallant-yard, only there must be a block at the mast-head.

Some use a gun-tackle purchase.

Q.—Are there any precautions you would take?

A.—Have some stout rope to go round yards and masts as preventer parral till all was ready; and in the case of a topsail-yard, have stops in the weather rigging.

Q.—Ship on port tack and heeling over, proceed to send up a royal-yard.

A.—Reeve the halyards and overhaul them down on the weather side abaft all, bend on amidships, and step out to the quarter of the yard. Get a tripping line to the port yard-arm, sway away—having a man aloft to steady the yard.

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## TACKING, WEARING, BOXING, &c.

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Q.—You are going to **stay in narrow waters**, what is the first thing to look out for?

A.—See if there is anything in the way on the weather quarter or astern.

Q.—How would you **tack** the ship, suppose you are **close upon a wind** in moderate weather, with all your sails set?

A.—Keep her a good full, for stays. *Ready about!* Send all hands to their stations. Ease the helm down gradually. *Helm's a-lee!* and let go the jib-sheets and fore-sheets,\* and as the sail shakes, *Raise tacks and sheets!* and when nearly head a-wind (wind about a point on the weather bow), *Mainsail haul!* down main-tack, and haul aft the sheet; haul over the head-sheets when the wind comes on the other bow; when full shift the helm, *Let go and haul!* down tack, haul aft the sheet, and as she gathers headway brace sharp up, haul out the bow-lines, and stand on.

It is best to haul the mainsail just before you get the wind right ahead, for then the wind, striking the weather leeches of the after sails, forces them round almost without the braces, and you will have time to brace up and get your tack down and sheet aft, when she has payed off on she other side.

If a ship has lost her way through the water the main-yard must not be hauled until the wind is right ahead.

When tacking, never brace-to the head-yards unless it be absolutely necessary to prevent the ship from going ashore, or when she has no headway to come round of herself.

[In working ship without the mainsail, the order “topsail haul” is given in lieu of “mainsail haul,” and the order “tacks and sheets” omitted.]

Q.—How would you station twenty-two hands when the order is “*Hands about ship*”?

A.—Boatswain and three men on the forecastle head, carpenter and sailmaker at the main tack, one man at the weather cro’-jack braces, seven men at the weather main braces, second mate at the lee main braces, three men at the lee cro’-jack braces, two men at the main sheet, and two at the fore sheet.

Q.—Where would you station them when it is “*Let go and haul*”?

A.—Except three on the forecastle, all should be stationed at the lee fore braces and fore sheet. Second mate at the weather fore braces. Those on the forecastle to board the fore tack and haul the bowline out.

Q.—In **tacking** ship, when do you **right the helm**?

A.—As soon as the ship begins to come-to on the other tack.

[The time to right the helm depends upon the speed of the ship through the water, but if the ship loses her way through the water altogether the helm should be *righted immediately*.]

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\* Directly the helm is down the head and fore sheets are let go to take the wind out of the jib as soon as possible.

Q.—The ship is in **stays**, and **loses her way**, what will you do with the **helm**?

A.—Shift it over the other way.

Q.—If your ship is **lazy in stays** how will you act?

A.—Check the lee fore brace, and haul the mizzen-boom well 'midships.

Q.—In **staying** what is to be **particularly noticed**?

A.—If the ship gathers stern-way, to shift the helm.

Q.—The ship is on the **starboard tack**, and has **stern-way**, what would you do?

A.—Put the helm a-port.

Q.—In a dark dirty night you are putting your ship about, how would you know if she had stern-way?

A.—By feeling if there was any extra strain on the wheel.

Q.—Tacking ship—your vessel carries too much weather helm?

A.—Brace up the head-yards more, and ease the spanker sheet.

Q.—If she carries too much lee helm?

A.—Brace up sharper aft, and take a pull of the spanker sheet, or haul down the flying jib; ease the head sheets.

Q.—What would be the **effect of shortening** in the **lee fore** like the lee main tack?

A.—Doing so would make a back sail of it and prevent the ship coming to.

Q.—Suppose while **swinging your head yards**, your **vessel falls** off too rapidly, so as to bring the wind abeam or abaft, what will you do?

A.—'Vast bracing! Ease off head sheets and put my helm a-lee: and as she comes up meet her with the helm and brace sharp up.

Q.—In **staying** suppose your **ship paid right off** before the wind, how would you act?

A.—I should keep the fore-yard square until she came to, then trim.

Q.—If (as sometimes happens with vessels which carry a strong weather helm) she does not fall off after the after sails take?

A.—Be careful not to haul the head yards until she is fully round; and if she should fly up into the wind, let go the main sheet, and, if necessary, brail up the spanker and shiver the cross-jack yards.

Q.—In tacking, if the ship misses stays, what is to be done?

A.—Either fill on the same tack and try again, or let her go round on her heel.

Q.—How would you **turn a ship round on her heel after missing stays**?

A.—As soon as it is certain that the ship has missed stays, and whilst her head is going off from the wind *Haul aft the head and fore sheets!* *Up mainsail!* *Brail up the spanker!* As the wind comes on the bow and

shakes the sails *Square the after yards!* and as the wind draws aft *Brace up the after yards!* on the other tack. *Set the mainsail* and *Square the head yards!* When the wind is on the other quarter *Set the spanker!* shift over the head sheets. As the wind comes forward brace the fore yard forward, keeping as little wind in the head sails as possible without shaking them. When the wind is abeam *Brace sharp up!* Haul aft the sheets.

**Q.—After hauling the main-yard,** you find the **ship falling off again?** (Port tack before going round).

A.—Put the helm a-starboard, haul aft the head sheets, and haul the main-yard round again, and when she fills, brace up and try her again; or else wear by squaring the main-yard, and brailing up the spanker, porting the helm as she gathers headway, and bring her to the wind on the starboard tack.

**Q.—If, while in stays,** you discovered, either **just before or after hauling the main-yard**, that there was **danger close upon** (what would become) **your lee beam**, what would you do?

A.—Run the weather braces in, and make a stern board till clear.

**Q.—You have just tacked** ship and she **falls off**, there is a **ship on the lee bow**, what would you do?

A.—Let go the head sheets and fore sheets. If she still falls off, check the fore brace, haul the head sails down, and haul in the weather fore brace.

**Q.—The wind freshens** considerably; **topgallant-sails and royals** are taken in; what **precautionary directions** would you give before hauling the head yards?

A.—Ease away the weather head-braces with a turn, keeping a strain on them when the yards fill, and standing by to belay in time; for if let go and overhauled, as in moderate weather, a sprung yard would be the possible consequence.

**Q.—Wishing to fore-reach** as much as possible **in stays**, what will you be particular about?

A.—Ease the helm down very gradually, haul the main-yard the moment you can ensure staying, and in a fresh breeze keep fast the fore sheet if the ship works well.

**Q.—A vessel close to** renders it necessary that you should **fore-reach as little as possible**, what will you do?

A.—To avoid fore-reaching, round-to quickly, check the lee head braces, and make a late haul of the main-yard.

**Q.—It falls light wind**, leaving a **head swell**; finding it necessary to tack, what measure will you take to ensure staying?

A.—Keep away a little and get as much way on as possible before putting the helm down. Man the head sail down-hauls, ease the helm down, check the lee head braces and head bowlines, bracing-to the topsail and upper yards, to present their leeches to the wind. *Helm's-a-lee!* Haul down the head sails; brace up the head yards as she comes to the

wind, for the same purpose as at first, and, also, when they are aback, that the lateral pressure on the bow may be increased. Keep the fore-tack down when you raise tacks and sheets, if not accustomed to do so on all occasions, and when the wind is fairly round on the other bow, haul the main-yard, and hoist the head sails.

[In a light breeze, or tacking against a heavy head sea, the head sails are hauled down and the lee fore braces checked a little to ensure the fore- topsail taking aback.]

**Q.—How do you **boxhaul\*** a ship?**

A.—Put the helm down, light up the head sheets, and slack the lee braces, to deaden her way. As she comes to the wind, raise tacks and sheets, and haul up the mainsail and the spanker. As soon as she comes head to the wind, and loses her head-way, square-to the after yards, brace the head yards sharp aback, and flatten in the head sheet. The helm being put down to bring her up will now pay her off, as she has stern-way on. As she goes off, keep the after sails lifting, and square in the head yards. As soon as the sails on the foremast give her head-way, shift the helm. When she gets the wind on the other quarter, haul down the jib, haul out the spanker, set the mainsail, and brace the after yards sharp up. As she comes-to on the other tack, brace up the head yards, meet her with the helm, and set the jib.

**Q.—How would you **wear†** a ship?**

A.—Haul the mainsail up, brail the mizzen in, luff the ship up until the weather leeches of the topsails shake; then hard a-weather the helm, and brace the after yards in, and keep the sails shaking as she pays off, so that they may be well canted for the other tack by the time the wind is on the quarter. When the wind is abaft the beam, raise the fore tack, and shift the head sheets over as soon as they are becalmed. The head yards being nearly becalmed, run them square; and all the weather braces being slacked off roundly as the ship comes-to, gather in the main and cross-jack braces while the head yards are being braced and fore-tack got down. In wearing under small sail in a ship that answers her weather helm slowly, take care that the main- topsail is not shaken until the ship begins to pay off, since ships which differ in build and class differ very much in these respects.

If blowing hard while before the wind the fore-yard should be braced forward, in order that it should *not* come a-back in flying-to.

The time to right the helm depends upon the ship; but take care not to let her come into the wind after she is round.

**Q.—You are on a **lee-shore**, and could **clear the danger on the other tack**, but you have not room to veer, and she won't stay, you have anchors, but the roadstead is bad, what will you do?**

A.—I would cock-bill the lee anchor, get a hawser on for a spring and lead it to the lee quarter; range the cable and unshackle it abaft

\* Boxhauling is wearing a ship by a series of manœuvres so as to avoid running to leeward as in ordinary wearing.

† Wearing ship is turning the vessel round head from the wind till she comes-to on the other tack. When working to windward you never wear when you can stay on account of losing so much ground.

the windlass. *Helm's a-lee!* and *Raise tacks and sheets!* as for going in stays. The moment she loses head-way, let go the anchor and *Mainsail haul!* As soon as the anchor brings her head to the wind, let the chain cable go, holding on to the spring; and when the after sails take full, cast off or cut the spring, and *Let go and haul!* This is **club-hauling.**\*

**Q.—State why a sail should never be backed** in this evolution, to be well performed?

**A.—It would lessen the ship's head-way, and, consequently, the power of the helm.**

**Q.—Wear** in as **short a space** as possible. (Wearing short round.)

**A.—Suppose on starboard tack before going round,** I would throw the ship up in the wind to deaden her way, haul up the mainsail and brail up the spanker; brace the head-yards a-box, and square the after yards; put the helm a-port when she gathers stern-way, amidships when she loses it, and a-starboard when the after sails fill and she gathers headway. Square the head-yards as in wearing, and as the wind comes round on the port quarter, brace up the after-yards, haul out the spanker, and board the main-tack. This is boxhauling.

**Q.—When is it necessary to wear a ship?**

**A.—This evolution generally takes place from three causes.** First, when there is not a sufficiency of wind to tack the ship will generally wear; secondly, you are obliged to wear when it blows too hard to tack; and, thirdly, you must wear when the ship will not come round against the sea.

**Q.—You are lying-to** in a gale of wind under a **close-reefed main-topsail**, and the ship **breaks off**, what would you do?

**A.—I would wear her.**

**Q.—Why would you wear her?**

**A.—Because she would head the sea more on the other tack, and, therefore, lie-to easier.**

**Q.—How would you wear her?**

**A.—I would set the fore-topmast-staysail, and would watch her falling off;** put the helm up, and, as she pays off, haul in the weather after braces, keeping the main-topsail clean full. When before the wind steady the helm, square the head-yards, down fore-topmast-stay-sail, and stow it, watch for a smooth to bring her to, down helm, brace up as she comes to, and meet her with the helm.

**Q.—In wearing ship when hove-to, why do you watch when she falls off?**

**A.—Because then she does not require so much helm.**

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\* Clubhauling is getting a ship round on the other tack when she won't stay and there is not room to wear, or boxhaul.

Q.—You are under three lower topsails and fore-topmast-staysail, proceed to **wear the ship round**?

A.—Put the helm up, and, as the vessel goes off, square the after-yards, and keep them just lifting. When before the wind, brace round the fore-yard for the other tack, but not sharp up, and put the staysail-sheet over. Brace up the after yards and meet her with the helm. Trim sails and stand on.

Q.—How would you wear ship under a mainsail?

A.—Set the fore-topmast-staysail for an off sail, watch when the vessel falls off, put the helm hard up, raise the weather clew of the mainsail, and square in the after yards. When before the wind, shift over the staysail sheet and get the weather tack down as low as possible, watch a smooth, and bring her to.

Q.—Why do you raise the weather clew of the mainsail?

A.—To assist the ship to pay off, and to allow more men to work the braces.

Q.—How would you **wear under bare poles**?

A.—Some vessels which are well down by the stern will wear in this situation by merely pointing the after yards to the wind or sending down the mizzen-topmast and the cross-jack yard and filling the head yards; but vessels in good trim will not do this. To assist the vessel, veer a good scope of hawser out of the lee quarter, with a buoy or something for a stop-water attached to the end. As the ship sags off to leeward the buoy will be to windward, and will tend to bring the stern round to the wind. When she is before it haul the hawser aboard. If the vessel will not go off, it will be necessary, as a last resort, to cut away the mizzenmast, veer away the hawser, and use the mizzen-topmast as a drag to assist in wearing.

Q.—**Wearing, blowing hard; how do you shift the fore and main-staysail sheets over?**

A.—First haul down the sail, shift over the sheet, steady aft, and hoist.

Q.—**Wear under staysails** in a gale of wind.

A.—Put the helm up, brail up the after trysail, and trim the yards as with sail set. In a very heavy sea it may be necessary to goose-wing the foresail for the purpose of keeping way on the ship, and preventing her being pooped, even at the risk of not being able to furl again. In the meantime, shift the sheets over and steady them aft; and, when before the wind, set the after sails and haul down the fore and main-staysails, setting them again as soon as the sheets are shifted over.

Q.—Suppose you are on a **lee-shore, and not room to veer or stay, no anchorage**, how would you put the ship's head round?

A.—I would put the helm a-lee, and when she came head to wind, let go tacks and sheets and haul them all aback, get in the lee tacks that she may fall round on her heel, and when the mainsail shivers I would haul it up; when she gathers headway shift the helm, and when

the wind is on the quarter set the spanker, mainsails, &c., and bring her close to the wind.

**Q.—Your ship is near a lee shore, with a strong head sea, she won't stay, how would you act?**

A.—I would haul up the mainsail, take in the mizzen, shiver the after yards, let go the fore tack and sheet, jib-sheets, &c., and haul the fore yard aback; when she has fallen off enough shift the helm, and help the head-way with the sails, and round according to the method of veering; care should be taken not to shift the helm until she gathers head-way. This is **boxhauling** a ship.

**Q.—She is too near to boxhaul, what would you do?**

A.—I would clubhaul her.

**Q.—It is thick, the wind is along the land, you are standing in towards it and make it suddenly half a cable's length off, what would you do?**

A.—Stay ship; if she refuses to stay, *make a stern board*.

## LYING-TO, SCUDDING, GETTING ABACK, SQUALLS, &c.

### *Lying-to.*

Sail should be set to allow the ship to remain as steady as possible; with too much head or after sail she will be continually yawing about.

As the wind lulls after a gale, sail should be made to steady the ship, but not to force her against a head sea, as the wind goes down much quicker than the sea.

As a general rule, the main-topsail close-reefed is the best—as any other sail would, in all probability, be becalmed. Sometimes the fore-topmast-staysail is used to great advantage, especially if the mainmast be far aft. The helm should be kept about half-way down, but after sail should never be set to make the ship lie higher, as it brings her so close to the wind that she loses her headway, and is then knocked off by the sea until she brings the wind far enough abeam to gather headway again; whereby a constant off and coming to is maintained. The forward and after yards should be pointed to the wind, and the main braced sharp up, with the yard clear of the cap, as the sail by being flat is not so apt to slacken, and if the ship should forge ahead too much, which will probably be the case in a sharp vessel, back her head yards.

### *A Sudden Shift of Wind.*

If the ship has way enough, use the helm to bring the wind into its old position, shortening sail at the same time; then trim as requisite, and bring the ship to her course.

If the ship has not sufficient steerage way, up mainsail and spanker. Square the main-yard, shortening sail as requisite at the same time. Then manoeuvre with the head and mizzen yards.

If the wind shifts on the lee bow, "go about," swinging the after yards as soon as possible, and shortening sail if necessary.

**Q.—Running under double-reefed topsails and foresails, wind aft, you want to bring the ship to the wind, what would you do?**

A.—Close-reef the topsails and haul the foresail up, watch a smooth, put the helm down and brace up the after yards, and, as the vessel comes-to, brace up the fore-yard, then stow the foresail.

Q.—Running in heavy weather, and not wishing to go beyond your port during the night, how would you heave-to, there being no fore-and-aft canvas bent?

A.—Put the helm down, brace fore-yard sharp up full, and the after yards a-box.

Q.—Going along with a strong breeze two points abeam the starboard beam, with fore and main-topsail, full foresail, jib, and mizzen, how would you stop her way?

A.—By hauling in the starboard main brace, and shiver the main topsail.

Q.—You have a ship on the lee-beam, the wind is very light, and you are sagging down upon her, you have your helm down, and she will not come-to, how will you bring her to?

A.—Haul down the head sails, spanker boom sheet to windward, and haul on the weather fore-brace until the sail shakers.

Q.—She still has headway, what would you do?

A.—Fill the main-yard, and haul in the starboard fore-brace; the head yards are then right abeam.

Q.—She will not lie-to, but still sheers off?

A.—Haul down the head sails.

Q.—Now wear her round (the helm being of no use)?

A.—Run the jib up, brail in the spanker, shiver the after yards; she will then fall round on her heel.

Q.—Running before a heavy gale with three lower topsail set and reefed foresail, what would you do first before bringing the ship close to the wind?

A.—Take the foresail in and furl it.

Q.—After bringing the ship to the wind she makes bad weather, what would you do to ease her?

A.—Take in the lower mizzen-topsail, and if she still makes bad weather, take in the fore-topsail, and heave-to under the main-topsail.

Q.—You are **running** in a heavy gale of wind **under two close-reefed topsails and reefed foresail**, and you wish to heave the ship to, how would you proceed to do it?

A.—Clew the fore-topsail up and furl it, see the spilling lines rove on the foresail, then haul the foresail up and bring the ship to, haul in the weather brace till the sail shivers, then furl.

Q.—Scudding in a gale under **close-reefed main-topsail, reefed foresail, and fore-staysail**; lay the ship to?

A.—Haul the foresail up, and if I find I can run her with safety for a short time, under the topsail and staysail, furl the foresail before bringing her to the wind. If, however, there is such a sea running

that I cannot keep before it after shortening sail, I would look out for a smooth, down with the helm, and round short to, in order to avoid exposing her broadside to the sea a moment longer than is absolutely necessary.

Q.—When **running** with a **fresh breeze right aft**, what is to be done?

A.—Brail up the spanker, haul the mainsail up, and haul down the head sails.

Q.—How would you act **if the wind shifted suddenly round to the beam?**

A.—Let her go off a little, haul the fore yard forward, aboard fore tack, haul the fore sheet aft, set the jib, haul the after yards forward, set the mainsail, spanker, and staysails.

Q.—Suppose the vessel is **taken all aback**, what would you do?

A.—Brace the fore yards round the other way, and try to box her off.

Q.—Provided she **would not pay off**, what would you do?

A.—Brail in the mizzen and let her come round on her heel, acting the same way as veering her.

Q.—If your ship comes-up in the wind, through bad steerage or otherwise, how will you get her head off again?

A.—First, try by flattening in the jib-sheets; if that will not do, brace round the head yards, which will send her head off away from the wind.

Q.—Running with **square yards, topmast and lower studdingsails set, you are taken all aback**, how would you act?

A.—Let fly the topmast-studdingsail tack and lower halyards, shift the helm, and brace the yards round, putting the ship on the tack nearest her course.

Q.—You are going along with light winds, close-hauled, and the wind draws aft; proceed to trim sails, &c.?

A.—Square the after yards, then the head yards, trim the mizzen-boom, haul taut fore and main lifts, rig out the weather booms, and set the weather studdingsails.

Q.—The wind draws right aft, what would you do?

A.—Lay the yards right square, down all fore-and-aft sails, up mainsail, and set the studdingsails on the other side.

Q.—The wind comes off the quarter again?

A.—Haul the head yards forward, then the after yards forward, take in the lee studdingsails, and set all fore-and-aft sails and mainsail, lee sheet aft.

Q.—The wind hauls ahead?

A.—Let her go off until the yards were full, haul the fore yard forward, then the after yards forward, down main tack, take in the studdingsails, brace up sharp, trim the sails, haul out the bowlines, and keep her full and by.

Q.—Going along with studdingsails on the port side, and the wind suddenly comes off the starboard bow, what would you do?

A.—Hard a-starboard the helm, let go the studdingsail tacks and outer halyards, brace round the after yards, and let the mizzen-boom go over; when the after yards are full, right the helm and brace the head yards round, take in the studdingsails and trim sails.

Q.—**Running before a gale under close-reefed topsails and reefed foresail**, a heavy sea right aft, the wind suddenly hauls right abeam, how would you act?

A.—Brace the fore-yard forward then the main-yard, being careful not to let the ship go off more than half a point or a point, so as not to bring the sea on the lee beam.

Q.—Under the same circumstances, suppose the wind to fall light, causing the sea to break over the quarter, what would you do?

A.—Set more canvas.

Q.—Running with a **gale on the quarter, under close-reefed fore and main-topsails and fore-staysail**, you are brought by the lee?\*

A.—Put the helm down and brace round directly, unless in the meantime she answers the helm and brings the wind on the weather quarter again; though the probability is she will either lose her masts or be thrown on her beam ends.

Q.—Suppose your vessel to be scudding under a close-reefed main-topsail and reefed foresail, with the wind on her port quarter. She falls off suddenly and brings the wind on the starboard quarter, laying all aback?

A.—Hard a-starboard the helm, raise fore tack and sheet, and fill the foresail, shivering the main-topsail. When she brings the wind aft again, meet her with the helm, and trim the yards for her course.

Q.—Going up a narrow channel on the starboard tack, heading South, and the wind suddenly shifts to the S.S.W., what would you do?

A.—Hard up the helm, brail in the mizzen, ease off the main sheet, and get the sails in as fast as possible, taking in royals and topmast-studdingsails, and, if necessary, reef the topsails.

Q.—Wind on the **starboard quarter**, the vessel is **taken aback with the wind four points on the lee bow**; state what you would do?

A.—Keep the helm hard-up, brail the mizzen in, and haul in the starboard main and port mizzen braces; when she gathers head-way hard a-port the helm, swing the fore-yard, set the after canvas, brace up, and stand on.

\* **Brought by the Lee.**—This is when a vessel is scudding with the wind quartering, and falls off so as to bring the wind on the other side, laying the sails aback. This is more likely to occur than broaching-to, especially in a heavy sea.

Q.—**Port tack**, the wind suddenly shifts to the lee beam, what would you do?

A.—If the ship has stern-way put the helm a-port, haul the after yards round, then the fore yard, shift the helm, down tacks, sheets aft, and stand on.

Q.—What is *broaching-to*, what is it usually **owing to**, and what is the remedy?

A.—This is when a vessel is scudding and comes up into the wind and gets aback; but is exclusively applied to a ship in bad weather, when it becomes a situation of great danger to the ship and spars. When running free with the sea on the quarter, want of attention is the common cause of such a mishap. Put the helm up, lower the topsails if they are standing, and if she does not pay off, box off or brace up as the occasion demands. Should, however, the ship be going over, I would let fly everything instantly.

#### *A Heavy Squall to Windward.*

In spanker and upper sails, up mainsail. Lower the topsails, bracing the yards in clear of the rigging, but not squaring them, brace in the lower yards. Haul the reef tackle close out. Buntlines, clewlines, lee-braces, and trusses well taut. Set the fore-topmast-staysail. Down jib and stow it, if possible.

If plenty of sea room, and the squall looks heavy, keep away before it strikes you; otherwise, if you wait till it is upon you, you will find all the damage done long before the ship commences to pay off.

It is recommended to keep the foresail set to assist in paying off the ship's head.

If caught in a squall with a square-rigged vessel, "keep away." The sails must not be got aback by luffing, as the ship would be unmanageable.

If caught in a squall with a fore-and-aft rigged vessel, check the sheets and luff.

If a ship is in irons, "up mainsail," square the main yard, and manœuvre with the other sails.

Q.—If you are **caught in a squall, under plain sail**, how will you act?

A.—If taken in a squall, with the wind on the beam, before it or close-hauled, I would keep my luff, and lower away and clew up all as fast as I could. In doing so the ship would be relieved, and the canvas got in better than if the helm had been put up; but in a squall, with the wind abaft the beam, putting the helm up and running away from it, as well as shortening sail, will then be the readiest mode I can adopt to ease the ship.

Q.—You are on **starboard tack**, fresh breeze, under single-reefed topsails, courses, jib, and spanker, you are taken **flat aback**, with the wind on the **lee beam**, give your immediate orders. State what you will do with the ship and the helm,

A.—Hard a-port, take in the mizzen, and square the main yard ; the head sails will then box her off. When before the wind bring the yards square.

Q.—Suppose you are on the **port tack, under plain sail, and in a heavy squall, the wind shifted fourteen points**, what would you do ?

A.—I should have taken the precaution, if the sky looked like a shift of wind, to take the mizzen as well as the mainsail in. When the squall struck me, I would starboard my helm and lay the main yard square, the foresails and jibs being aback will easily pay the head off and let her come before the wind ; then take in sails according to the wind ; after this, trim yards. If it blow so hard that I had to let go all the halyards, I would only start the topgallant-sheets a very little, so as to let the topsail-yards come down, then haul out reef-tackles. Brace the topgallant-yards as near to the wind as possible, clew up and stow.

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## A C C I D E N T S .

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### *Heavy Dew or Wet Weather.*

The sails and all the ropes shrink and shorten in cold or wet weather, and give out again in dry or warm weather ; therefore the halyards should be lowered, and the tacks and sheets checked a little. The longer the rope the more it takes up, therefore royal halyards and top-gallant sheets are most likely ropes to carry away.

Q.—Your jib-sheet is carried away—blowing fresh ?

A.—*Mind the weather helm.* Steady the sail with the weather sheet, then haul the sail down.

Q.—The tack of jib carried away.

A.—The tack will fly up the stay a little, bringing more strain upon it ; let go the halyards and haul the sail down as quickly as possible.

Always remember that should anything happen to any of the head sails, such as sheet gone, sail split, tack carried away, stay gone, such immense leverage is taken away at the bow of the ship that she is almost sure to fly up into the wind, and orders should immediately be given to the helmsman to *mind his weather helm*.

Q.—Your **jib down-haul carries away**, how will you get the jib down ?

A.—Let the ship go off a few points, send three or four hands to the jib, and haul it down.

Q.—Your jib halyards are carried away ?

A.—Haul the jib down with the down-haul, easing the sheet when the sail is about two-thirds down the stay. Bend the staysail halyards in the place of the jib halyards. Hoist away.

Q.—On a wind with a stiff breeze, the land is on the lee, and no room to keep away, your jib guys carry away, what would you do ?

A.—Get a hawser and take it out to the jibboom, taking a round turn round the jibboom end, and seize the end back, put a luff tackle on it, setting it up in the place of the old ones.

Q.—Your jib-stay is carried away?

A.—If the jib does not split at once, check the sheet to spill the sail, but not sufficiently to shake it; put the helm up at the same time. Keep the ship away to becalm the sail, then haul down and stow the jib. Hoist the fore-topmast-staysail, bringing the ship to her course.

If not room to keep away, go about, hauling the sail in whilst head to wind.

Q.—If the martingale carried away, what would you do?

A.—Keep the ship before the wind, take in the jibs, the fore-royal and fore-topgallant sails to ease the jibboom. Then repair damage.

Q.—Running before the wind, how would you take in the slack of your bobstay?

A.—Put the single block of a tackle on the knight-head, the double block on the lanyard, and set it up.

Q.—One of your bobstays is carried away in the middle, how would you secure it?

A.—Pick the other end up, overhaul the lanyard, and shackle both parts together with a shackle of the stream cable.

Q.—Your ship is **by the wind**, blowing fresh, and you **carry your bobstay away**, how will you proceed?

A.—Immediately put the ship before the wind; and should the bobstays be gone in the way of the cutwater, it will be difficult to reeve new bobstays. Take a few lengths of the stream chain cable, with which make a clove-hitch round the bowsprit, as much outside the bobstay collars as possible; then take the two ends in through the hawse-pipes, one on each side, and heave them both well taut together with the windlass. When done, bring the ship to the wind until I can reeve my proper bobstay.

Q.—Your bowsprit is secured by an iron band for gammoning, it is carried away, how would you secure the bowsprit?

A.—Cut a hole through the stem, get a length of chain and pass another gammoning, and set it up.

Q.—Wind on the beam, a moderate breeze, land on the lee bow, and your **jibboom carries away**, what would you do?

A.—Let go royal, topgallant, and topsail halyards forward; shorten sail, bring the ship to the wind, back the main and cross-jack yards, and clear away the wreck.

Q.—You are carrying whole canvas on a wind, and you **spring your bowsprit**, what would you do?

A.—Get the ship before the wind; reduce sail. Get a hawser from the topmast-head, and another from the lowermast-head, in through the hawse-pipes, and set them up to the windlass. Send down the

fore-topgallant and royal masts, and take in the flying-boom and jibboom. If necessary, fish the bowsprit with the flying-jibboom or spare spars, reeve the stays through the hawse-pipes and set them up.

Q.—Your **bowsprit is carried away**, what is the first order you would give?

A.—Hard-up the helm.

Q.—How would you assist the ship to go off?

A.—Haul up the spanker; take in all the after canvas, and shiver the main yard if required.

Q.—How would you **secure the foremast?**

A.—Get a hawser from the mast-head in through the hawse-pipes, not forgetting to worm and parcel it in the way of the chafe. Clear away the wreck, get the stays rove through the hawse-pipes, and set them up.

Q.—Your **rigging** has become **very slack**; being **unable to set it up**, what will you do?

A.—Reeve a rope through a single block on each shroud, and bowse on it at both ends till the rigging is taut, making the after end of the rope fast to the after shroud, and the fore end to the fore shroud.

Q.—If the **cap on the mast-head had worked loose**, what would you do?

A.—Make wedges and wedge it tight again; if this could not be done, I would put a good lashing round the topmast and lowermast-head, and frap it well between the doublings of the mast.

Q.—**If the trestle-trees were carried away, and you were afraid of the topmast coming down**, how would you act?

A.—I would reeve as stout a rope as the sheave-hole would permit through it, splice a thimble in both ends, and set it up as tight as possible to the eye-bolts in the cap, or to the cap itself.

Q.—Suppose you **carry away the truss of your fore yard?**

A.—Fit two chain strops round the yard with thimbles in each strop, another piece to go round the mast with a round turn, well parcelled, and the ends to reeve through the thimbles; set up to the after part of the trestle-trees with a gun-tackle purchase. To prevent chafing put a large mat between the mast and the yard.

Q.—**Your fore yard is carried away**, and is perfectly useless, what would you do?

A.—Send down the main yard and send it up forward.

Q.—**The fore-topmast is sprung just above the cap**, how would you secure it?

A.—Lower it down till the part sprung is below the cap, and either hang the topmast, or cut another fid-hole. Shorten the stays, backstays, and rigging.

**Q.—Your lower cap is carried away,** how would you secure the topmast?

A.—With a Spanish cap; that is, with a small chain passed round the lowermast-head and topmast, and frapped together.

**Q.—Your main yard is sprung in the slings,** how would you act?

A.—If the main yard was sprung in the middle, take a couple of studdingsail-booms and cut them lengthways, in two halves, put these four halves round the yard and fish it.

**Q.—It is sprung in the sheave-hole,** how would you act?

A.—If it was broke in the sheave-hole, cut the yard length-ways, in two halves, then turn one of these pieces end for end, put them together again, bolt and fish it.

**Q.—Your fore-topmast is sprung;** proceed to shift it; give a detailed description of the process. State **how you will get the cross-trees and rigging off in a mass, and point the new mast through**, without stripping the mast, in detail?

A.—Let the topmasts come down, having cross-trees, rigging, &c., on the lower cap, put a stop or two round to keep them on, if necessary; but their own weight will generally suffice.

**Q.—On a wind, close hauled with all plain sail set, your topmast-backstays are carried away,** state what is the first thing you would do?

A.—Let go the royal, topgallant, and topsail halyards, *up helm*, and bring the wind on the other side.

**Q.—Suppose the parrel of your topgallant-yard carries away?**

A.—In such a case much of the whole force and weight of the yard and sail are thrown at the mast-head, and the topgallant-mast is endangered by it. If the ship is by the wind, brace the topgallant-sail aback immediately, and lower it at the same time; but, if before the wind, immediately brace by and lower the topgallant-yard. I should take care that the topgallant sheets are not started, as that would much endanger the mast by the sail forcing itself against, and perhaps entangling itself round the topgallant-stay.

**Q.—If your topsail tie carried away,** what would happen to the yards?

A.—If the lifts hold the yard would go in the slings.

**Q.—You carry away the parrel of the main-topsail-yard,** state what you will do to get the **yard secured**?

A.—A topsail-yard parrel may be repaired in the same manner, if carried away in moderate weather; but, if blowing hard, with double or close-reefed topsails, the returning weight of the topsail-yard, and force of the sail when thrown aback, might endanger the mast, yard, or lee topmast rigging; as however taut the weather topsail-brace may be when the parrel is carried away, and the ship by the wind, the yard will surge over to leeward and thereby allow the yard to swing far from

the mast. In such a case I should instantly man the down-haul tackle and weather clewline, and haul the yard down until the lifts were taut, so that the yard might then be squared, and the parrel repaired.

The following is recommended by an excellent seaman :—In either case first spill the sail without its flapping; unbend the clewlines from the clews; if topgallant-sail, make the ends fast on the after trestle-trees; if a topsail, lash the clewline-blocks on the after part of the topmast cap, crossed; clew down the yard (with help of braces), secure the yard-parrel afresh.

**Q.—Your weather main-topsail brace gives way, what would you do to get the yard down?**

**A.—Ease the lee sheet to spill the sail, luff the ship to the wind, and lower away the halyards.**

**Q.—If the lower brace should carry away?**

**A.—Lower the topsail, hauling in the weather brace if needful. I should ease off the sheet of the course (short of splitting the sail), and let go the tack, for the first important duty is to save the yard. If this accident occurs forward, I should have the weather helm attended to.**

**NOTE.—**“One scend might break the brace, the next would break the yard; but there would be just time enough between the scends for a quick ready officer to start all the principal gear that would relieve the spar.”

Almost all large ships have now double topsail-yards, with braces on each making the yards more secure, therefore it will seldom be necessary to start the topsail-halyards on account of a lower brace breaking. Starting the sail-sheet would cause confusion to little purpose.

**Q.—Running with the wind a little on the starboard quarter, and the weather brace and the parrel of the main-topgallant yard carries away, what will you do?**

**A.—Up helm! and bring the wind on the port quarter, then you have a weather brace to steady the yard. Clew up and furl. Fit a parrel and reeve off a starboard brace.**

**Q.—If your topsail brace and parrel are carried away, how will you act?**

**A.—**If the weather brace should be carried away when the parrel goes, and the weather yard-arm flies far forward, it will then be advisable to put the helm up and bring the wind on the opposite quarter, keeping the yards braced up as before on the mast to which the accident has happened (*see carrying away topsails parrel*), and steer the ship so as to let the wind blow along the sail of the disabled yard, until it gently returns to the mast. When done, lash the yard on each quarter to the topsail rigging and the topsail tye-blocks well round the masts; then fit the weather brace and parrel.

Too much care cannot be taken in keeping fast the topsail sheets, as upon that will depend much of the safety of the mast, yard, and rigging, as the heavy flapping of a topsail will be likely to shake everything to pieces.

**Q.—If the topgallant-brace and parrel carry away?**

**A.—**Brace by the lower and topsail-yards, and, if necessary, sufficiently touch the ship with the helm to throw the topgallantsail slightly aback,

Q.—Your topgallantsail is furled, the parrel carries away, also the braces, sheets, and clewlines, leaving nothing fast to the yard, except the halyards and lifts; how would you secure the yard for a short time without leaving the deck?

A.—Mast-head the yard as close as possible.

Q.—Your main-royal stay is carried away, what would you do?

A.—Unbend the main-royal clewline and send it down before the topgallantsail, and let it run down the main-topgallant stay into the foretop. Then carry it aloft, bend on the stay and haul away on the clewline. Get the stay across in its place again.

Q.—You are running before the wind with the yards square, and carry away your maintopmast, and with it the foretopmast goes; what would you do, suppose a heavy sea is running?

A.—Set the foresail to keep the ship before the sea, then clear away the wreck.

Q.—The clew of the main-topsail is carried away, how would you fix it without sending it down?

A.—Clew the sail up, unbend the head earring, and take the clew of the sail into the top. Put a stopper round the sail to keep it from blowing about. Take a piece of rope the same size as the foot-rope of the sail, knot it at each end, seize it round on the clew, work the cringle in, bend the sail again to the yard, and set it.

Q.—Having clewed up the topgallant-sail, or the topsail, and a hand aloft tells you that the foot-rope of the sail is stranded, what would you do?

A.—Put a stopper on.

Q.—How would you do that?

A.—Get a piece of rope of the same size as the stranded rope, make a Matthew Walker knot in each end of it. Seize it on with a marline so that the stranded part shall come at the middle of the stopper.

Q.—Putting the ship about, you have swung the main-yard, a man falls overboard, what would you do?

A.—Let everything stand as it is, and lower a boat.

Q.—You are **by the wind, starboard tack**, close-hauled under single-reefed topsails, courses, jib, and spanker. *A man overboard!* Give the first order, state what you will do with the ship, which boat will you lower, and why? What precaution will you take before lowering the boat?

A.—Put the helm down, throw a life-buoy overboard, back the main yard, send a man aloft to watch the man, lower away the lee boat.

*When a man is overboard!* “If on a wind, there can be no question about “going about,” leaving the fore-yard square on the other tack, and lowering the boats when ready.”

Q.—You find the lee boat is in bad condition and unfit for use, what would you do then?

A.—Put the ship about, lower away the other boat, leaving the fore-yard a-box.

Q.—When obliged to **cut away the masts, which rigging would you cut away first?**

A.—Cut the lee rigging away first, then the stays, and afterwards the weather rigging. If riding head to wind, cut away all the rigging on both sides except the two foremost shrouds; then cut the stays and foremost shrouds together, and stand by for a run forward as the masts fall on either quarter.

“If it be required to cut away a mast, leave a few shrouds fast on that side towards which you desire the masts to fall.”—*The Naval Cadet’s Manual*, by Captain Boyd, R.N.

Q.—Suppose you were in a ship, on a wind, and you **lost all your sails, and you wanted to get the ship before the wind,** what would you do, ship not steering?

A.—Pay a hawser out of the lee quarter with a spar attached to it.

Q.—**Lying-to in a storm, your mainmast goes over the side?**

A.—Wear round if you can, and bring the wreck to leeward to prevent it injuring the ship; get clear of it as soon as possible.

Q.—You are **totally dismasted**, and, consequently, quite **unmanageable**; what will you do to keep the ship from foundering by the sea striking her astern or amidships?

A.—Rig a sea anchor with three spars in the shape of a triangle, and lash a sail across it; at one corner sling a weight proportionate to the size of the spars; span it, bend a couple of your largest hawsers to the span, launch it overboard, and ride by it until jury masts are rigged. If unable to move about on deck to do this, let go one of the bower anchors, with a hemp cable attached, and veer away a long scope, which will in some measure steady the ship by bringing her head towards the sea.

Q.—You are **thrown on your beam ends?**

A.—Let fly everything; when, if she does not right, but continues to go over, there is no resource left but to cut the lanyards of the weather rigging, if you have time, and let the masts go over the side, at the same time clearing away the boats. If in soundings, letting go an anchor will bring her head to wind and probably right her.

Q.—**One vessel in tow of another; the headmost one puts her helm down** to go round; how does the **other** proceed?

A.—When the ship ahead puts her helm down to go round the ship in tow puts her helm up, and always endeavours to keep directly in her leader’s wake.

## UNMOORING, MOORING, &c.

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When not tide rode pick the lee anchor up first.

If the weather anchor were picked up first, directly it was out of the ground the ship would drift to leeward past her lee anchor, most probably fouling it, but certainly bringing a severe jerk on the cable; the ship would also take up more than her own share of the anchorage.

Picking up the weather anchor last enables the ship to start further to windward than if she started from her lee anchor.

If the ship is tide rode either anchor may be picked up, helping the ship with a sail as required.

If there is a cross in the hawse with the lee cable on top, it must first be dipped under the weather cable, or the anchor would hook the cable; if the lee cable is under it will come up all clear.

In a close harbour the ship must be got under steerage way as soon as possible; but if there is plenty of room she should not be allowed to gather headway until the anchor is at the cat-head. If anchored in deep water it is sometimes necessary to heave-to.

If possible, when the **starboard anchor is down**, prepare for **casting to port**, and *vice versa*; otherwise the cable grows taut across the fore-foot.

**Q.—If moored and wishing to weigh, which anchor would you pick up first?**

A.—Pick up the lee anchor first, or you would foul it and any ship in your way by dropping down too quickly after weighing the weather one.

**Q.—In weighing under sail, what is the proper moment for tripping the anchor?**

A.—The anchor should not be tripped until it is seen that the ship is canting the right way; and if coming-to the wrong way, you must hold on till she casts as you require.

**Q.—How do you unmoor a ship?**

A.—Heave in the lee chain first, while veering away on the weather chain; after picking it up, cat and fish, then heave in the weather chain. If going to get under way, set the topsail, laying the after yards one way and the head yards the other, loose the sails, up anchor, stow it, and make sail.

**Q.—Proceed to bring your vessel up at single anchor?**

A.—Get the anchors off the rail, the working anchor a-cockbill, and the shank painter and stopper of the second anchor ready to let go at a moment's notice; have the squares of the windlass down, norman riding blocks shipped, and the range overhauled on *both* sides; see that the halyards, braces, and all running gear are down ready for use. Having a light breeze, reduce canvas by taking in royals and top-gallantsails, and haul up the courses. When close to your proposed

anchorage, lower away the foretopsail, haul down the jib, and round her to. As the ship comes head to wind let the fore and main-yards run square, and as soon as the vessel gets sternway let go the anchor. Pay out the chain, then clew up and furl all snug. Should the wind be at all fresh it would be advisable to clew up the fore-topsail, instead of merely lowering it down.

Q.—Coming to an anchorage, with a light leading wind, and you wish to moor with sixty fathoms under the quarters of two other ships at anchor, how would you do it?

A.—Haul the mainsail up, then the foresail, lower and clew up top-gallantsails. When far enough put the helm down. Haul jib down, spanker boom to windward, and when head to wind put helm amidships. Square all yards. When the vessel gets sternway let go.

Q.—You bring up **near a shoal**, how would you **sheer** the ship, and why?

A.—Generally *towards* the shoal; because the ground rises towards the shoal, and the anchor would hold better; and if the ship broke her sheer, she would go from the shoal; and, if in a narrow channel, to give more room to passing ships.

Q.—In moderate weather, **running with square yards**, wishing to make sure in bringing up that the vessel has **sternway** before letting go your anchor, what would you do?

A.—Brace up all the yards, down helm, and when the sails begin to shake let all the yards run square.

Q.—Proceed to bring your ship up in a roadstead with the **wind against the tide or athwart of it**?

A.—Stem the tide, pick out a good berth, take a cast of the lead, stow all the square sails that can be dispensed with, let the ship have a little either head or sternway over the ground, so as to carry the chain as it falls clear of the anchor, stream the buoy, and let go the anchor, being careful to sheer clear of it.

NOTE.—If the wind is blowing against the tide, reduce the canvas until the tide takes, but it is advisable to retain such canvas as will keep her under control should the anchor not take hold.

Q.—What will you look out for on coming-to with a weather tide?

A.—Look out and give her a good sheer to avoid being driven back over your anchor.

Q.—If the **wind is blowing with the tide**?

A.—Round the ship to with nearly all the after available canvas set, say, the main and mizzen-topsails, spanker, and after staysails. In this case it is not necessary to wait until the vessel has lost the whole of her headway, because the tide will make the anchor take hold.

Q.—How much **range would you overhaul**?

A.—Just sufficient to let the crown of the anchor touch the ground.

Q.—Proceed to **moor** a ship with 30 fathoms **each way**?

A.—Get about 70 fathoms of chain on deck for the riding anchor, and 35 of the other; let go the riding anchor and pay out to 60 fathoms; give her a sheer and drop the other. Pay out the cable of the latter

anchor and heave-in on that of the first until I have 30 fathoms of chain on each.

Q.—You are **riding head to wind** in light winds, proceed to **get under way on the port tack**?

A.—Set the three topsails, topgallant-sails, and the mizzen, then brace up the main and cross-jack for the port tack, laying the fore-yard a-box. Heave away on the cable, and as soon as the anchor is a-weigh and the jibs will take, hoist them. When the after yards are full, let go, and haul the fore yard round and stand on.

Q.—How would you use the helm?

A.—Put the helm a-starboard until she gathers headway, then bring her gradually to the wind.

Q.—How would you **cast** your ship when **getting under way**?

A.—*Casting to starboard*: Haul port fore braces and starboard main-braces forward, and let the after yards lie square. Hoist the fore-topmast-staysail, and hoist the sheet to windward to help her. *Casting to port*: Haul in the contrary braces. When cast, fill the head-sail, and brace up.

Q.—Your vessel is **lying with one anchor down**, how will you proceed to **get under way on the starboard tack**?

A.—Heave in short. Cast off the topsails, sheet home and mast-head them, brace up the after yards with the port braces, and the head yards with the starboard braces. Get the jib and staysail ready for hoisting, and the after canvas set, and the helm to port. Man the windlass and trip the anchor. Immediately the anchor is off the ground and the vessel begins to fall off to port, run the jib up, and, if necessary, stand by to fill the fore yard. Heave the anchor up, cat and fish it. Set the courses and the other requisite sails. If it is not necessary to have head reach on the vessel, it is as well to let the head-yards remain until the anchor is catted and fished.

Q.—If your ship is **wind rode** how will you act?

A.—As soon as the anchor is right up and down, put the helm the way you wish her to cast, hauling in the same braces aft, and the contrary forward.

Q.—If your ship is **tide rode** how will you proceed?

A.—Intending to cast to port, put the helm a-starboard, haul in the starboard fore braces and port main braces, and as soon as the anchor breaks out of the ground and the ship gets stern-way, change the helm; if intending to cast to starboard, *vice versa*.

Q.—You are lying in a roadstead and wish to get under way, your anchor is a-peak, but there is a **vessel on each quarter**, so that **you cannot clear by casting** when under sail, what would you do, the wind being right off the land?

A.—Run a kedge out on my starboard bow, and bring the kedge rope aft on my starboard quarter; trip my bower and swing to the kedge before making any sail. When swung to the kedge make sail and run between them before the wind.

Q.—Suppose it was **blowing fresh**, and you were afraid of the warp parting, what would you do?

A.—Break the anchor out of the ground and dredge between them. When clear of the ships, run up my head sails and heave up the anchor. Then make sail and trim all for my course.

Q.—Getting **under way with a strong breeze right ahead**, yards square, **which topsail will you hoist first**, and why?

A.—The fore-topsail, so as to becalm the main-topsail, making it easier for the men to hoist.

Q.—**In getting under way with a vessel on your port quarter**, and with a **head wind**, would you cast to her or from her?

A.—Cast to her and go under her stern.

Q.—Why would you cast *towards* her?

A.—Because if I casted *from* her I should most likely run stern on into her before I could gather head-way.

Q.—**You are anchored in a tide way, head to wind and tide**, and other ships are at anchor near; proceed to get under way on the **port tack**, getting the ship under command as quick as possible?

A.—Heave short, give the ship a slight sheer to starboard, set the topsails and topgallantsails, brace the after yards for the port tack so that they will soon fill. Brace the fore yard a-box, trip the anchor, run up the outer jib, shifting the helm as required. When the after yards are full, fill the fore yard and set the mizzen. Cat and fish the anchor.

Q.—You are anchored close to a long line of ships on your port beam, with a shoal astern of the leeward-most ship, running at right-angles to the line, weigh under canvas?

A.—Make sail, weigh and cast to port with the head yards a-box and the after yards square towards the object it is wished to clear, with the helm a-port; for, as the ship necessarily gets stern-way in casting, you recede from danger by turning her head towards it. Starboard the helm as she gathers way, brace up the after yards, and come to the wind on the port tack.

Q.—Weigh under sail in a **fresh breeze**, making as **little stern-way as possible**, as there is a **ship in your wake**, but without laying a kedge out.

A.—Heave in as short as safety permits; loose the courses, jib, and spanker, brace the yards for casting, set the foresail, and set and hoist the jib with the sheet to windward. Trip the anchor, attend the helm, board the main tack, and brace round the head yards when she pays off, haul out the spanker, let draw the jib-sheet, cat the anchor, and loose the topsails.

Q.—Weigh in a **weather tide, with the ship taut ahead of her anchor**?

A.—The ship will not lie broadside to the tide, because the effect of the tide on her broadside may be greater in proportion than that of the wind; and she may still, under the same circumstances, remain ahead of her anchor, because the wind acts with greater force on the ship's stern and on the squared yards than the tide does upon the bow. Riding then by the starboard anchor, port the helm and sheer her over, when she will remain at taut scope, stemming the tide, then heave in.

Q.—What do you mean by a foul hawse ?

A.—Bringing one cable across the other. If one cable lies over the other it is called a cross. When they make another cross it is called an elbow. Three crosses make a round turn.

Q.—If there is a cross in the hawse, which anchor should be picked up first ?

A.—The under one. If the upper anchor was picked up first it would hook the cable of the under one.

It is sometimes requisite to pick up the anchor belonging to the upper cable ; in this case dip it under, then weigh the anchor.

Q.—Which causes the least strain on a cable—lying at single anchor, or taut moored with the anchors well on each bow ?

A.—Single anchor—as a single rope will bear more weight than two if the two are taken well apart. They will bear an equal strain when the angle at the bow is 120 degrees.

Q.—**You are riding with two anchors and no mooring shackle**, how would you **clear hawse** if foul ?

A.—Get a good lashing round both chains, unshackle, let the end come down into the boat, pass the end round the other chain the opposite way. Send the end up, shackle, heave taut, and cast off the lashing.

Q.—You are going to moor your ship with 30 fathoms each way, you have **paid out about 30 fathoms** of the riding chain, but **dare not go any further astern**, how would you get the second anchor down in its place ?

A.—Run a kedge and a good hawser away, making a guess warp of it. Get the longboat under the bows and lower away the anchor by the cat-fall. Pass a slip rope round the shank of the anchor, having the standing part fast round the thwarts and through the ring. Then get as much chain in the boat as it can conveniently carry, having good stoppers on the thwart to keep it from running out too fast, and haul out the longboat by the hawser, veering out chain from the ship until enough, then veer away and let go.

Q.—How would you **bend a hawser to a kedge** ?

A.—Take two turns round the ring, pass the end under both turns, and leave a fathom of end.

Q.—What **precaution** would you take before **carrying out your anchor** ?

A.—I would have a good buoy rope fast to it, as I shall most likely have to pick it up with my boat when I get under way.

Q.—How and where would you bend on a buoy rope to an anchor ?

A.—Bend it on to the crown, with a hitch each side of the shank, forming a clove hitch. Stop the end to its own part.

Q.—How would you **lay a kedge** in a boat to carry it out ?

A.—Lay the stock over the stern, having the flukes in the boat on a spar, so as to be easily thrown overboard.

Q.—**How would you hang the anchor to the longboat** ?

A.—First make the standing part of the stopper fast to the after thwart; then reeve the other end up through the ring-bolt in the stern-post, under the stock of the anchor, round the shank, and under the other side of the stock; then haul well taut, take a round turn round the after thwart, and make it fast to the next thwart forward.

Q.—**How would you pick up the same anchor again,** supposing you had no room to veer away on it?

A.—I would take the longboat to the buoy, put a luff tackle on the buoy rope, and break the anchor out of the ground, then heave away to the chain on board.

Q.—Suppose the **buoy rope broke**, what would you do?

A.—I would put luff tackles on the cable in the boat; or under run the chain by the longboat.

Q.—**How would you moor a ship with a mooring shackle?**

A.—Get the boat under the bows, and lower the shackle down with a good rope into the boat. Bend a good hawser to the chain the ship is riding by. Slack up the chain, unshackle it, and shackle on the mooring shackle; repeat the same process on the other side.

Q.—You are brought up, it is stormy, what would you do?

A.—Take a cast of the lead, take cross bearings of some remarkable objects, double reef the topsails and mizzen, point the yards to the wind, get the second anchor ready, and see that the shackles could easily be knocked out of the cable chain in case I had to slip.

Q.—It is blowing a **gale of wind**, it is night time, you are on a **lee shore** and cannot keep off, there is a **harbour to leeward** where you have never been, and there are no pilots to be had?

A.—I would examine the chart very carefully, note the bearing of the light while running in, and also from the anchorage, and the depth of water, also the wind and the time of tide. I would make memorandum in handwriting that shall be legible on deck with the aid of a lamp. Get anchor and chain ready, and make every preparation so far as could be done in a heavy sea, and then keep the ship away from the harbour.

Q.—It is a **bar harbour**, state what **sail you will have set**, and how would you station the crew?

A.—I would set as much sail forward as the crew could manage, say, jib and staysail, sheets flat aft, whole foresail, double or single reefed fore-topsail, close-reefed main-topsail, main-yard square braces, two good hands at the wheel, one at the lead, all the rest of the crew at the fore braces, and myself high enough to have a clear view ahead.

Q.—Having **crossed the bar**, what would you do next?

A.—Clew up and haul down sail as snug as possible, and, if time, stow it; when at the anchorage round the ship to and stop her way, then let go the anchor.

Q.—How would you **let go an anchor in a heavy sea?**

A.—Let go both stopper and shank painter at the same time.

Q.—Coming to an anchor in a roadstead with a strong breeze, the anchor has **gone down foul**, what would be the consequence?

A.—The anchor would not hold, let go the other.

Q.—Having come to an **anchor in a roadstead, and the weather getting worse**, how much chain would you have out on the first anchor before you let go the second?

A.—The longer the scope on both chains the easier the ship will ride. I would, therefore, not pay out more than 45 fathoms of the first chain before letting go the second anchor. If I went into the anchorage, blowing a gale, let go the second anchor as soon as I could after the first.

Q.—You are **riding at anchor in a gale of wind**, how would you tell if your ship is **driving**?

A.—By fixing on two conspicuous objects on shore, which are open of each other in such a way that if the ship drove they would gradually appear in one and then open the other way. By close attention to these objects, or two lights similarly situated, I could tell immediately if the ship is driving.

Q.—Suppose you could see neither land nor lights, what then?

A.—Put the deep sea lead over the side and attend to it.

Q.—How would you attend to it?

A.—Having felt that the lead is on the bottom, I would hold the line loosely in my hand, and watch if the ship fell astern of it.

Q.—What other way do you know of ascertaining if the ship was driving?

A.—I could tell if the ship was driving by putting my foot on the chain.

Q.—You are lying in a roadstead with the wind **two points on starboard bow, your ship is driving**, and there is land on the **port bow**, you wish to get under way and proceed to sea on the **port tack**, and doubts are entertained of the ship casting the right way, how will you act?

A.—Get a hawser from the port quarter away forward outside of all, and make it fast to the riding cable outside the hawse-pipe, heave taut and make fast to the timber heads aft. Unshackle the cable at a proper length for veering, according to the depth of water, and secure the end with a good lashing, after which make fast a buoy to the end of the chain, the buoy-rope rove through the hawse-pipe. Loose the two topsails and mizzen, and double reef them. Haul in the port braces forward, and starboard braces aft. See the chain all clear and ready for slipping; watch a smooth, veer the chain, put the helm a-port. As soon as the ship pays off and the jib will take, hoist it up, when it takes and the mizzen-topsail is full, cut the spring, shift the helm and haul the fore-yard round, and trim her to the wind; not forgetting to have a good buoy-rope to the anchor.

Q.—You cannot get at the chain to bend on the hawser, how would you secure it?

A.—Take a length of chain and make a strop of it. Shackle the two ends of it together, then by means of a boat-hook dip the strop round the chain cable, and reeve one bight through the other and jamb it. Then secure the hawser to the strop.

## MANAGEMENT OF A SHIP AT SINGLE ANCHOR.

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If a ship be riding *head on* to the tide. **Then—**

If the wind be *ahead*, or *before the beam*, the ship is said to be **Riding Leeward Tide**.

If the wind be *aft*, or *on the quarter*, she is said to be **Riding Weather Tide**.

If the wind be *abeam*, she is said to be **Riding Wind athwart the Tide**.

If she be swung round by the force of the *tide*, she is said to be **Tide Rode**.

If she be swung by the force of the *wind*, she is said to be **Wind Rode**.

When the tide is done, and the ship begins to cant, she is said to **Tend to Windward**, or to **Leeward**, as the case may be.

Q.—What are the **principal points to be attended to in swinging a ship?**

A.—That she always swings on the same side of her anchor; that she has a taut cable; and, when swung, that she has a sheer from her anchor.

Q.—What are the general rules for a ship riding in a tideway at single anchor?

A.—A loaded ship will lie best to windward, and a light ship to leeward of her anchor; but all vessels, whether loaded or light, should be kept to leeward of their anchor as long as they will ride so.

Q.—How would you act with the wind on the quarter?

A.—A vessel, either loaded or light, with the wind on the quarter, will always lie best to windward of the anchor, bracing the yards forward in the same way as the vessel is sheered, and setting a little sail to run her past the anchor as the tide eases.

Q.—How would you act with the wind on the beam?

A.—Lay a loaded vessel to windward, filling all the yards, and a light vessel to leeward, with yards aback, acting at slack water as circumstances might require.

Q.—How do the tides run in the downs?

A.—Flood tide sets N.N.E., ebb S.S.W.

Q.—In Yarmouth Roads?

A.—S.W. by S.

Q.—How would you **lay a ship to windward** of her anchor in Yarmouth Roads, with the wind N.N.E., and the **wind stronger than the tide**?

A.—Hoist the fore-topmast-staysail and brace the yards all full, keep the helm a-weather until she brings the buoy on the lee quarter; then shift the helm to leeward, brace-to the head-yards, and haul down the fore-topmast-staysail.

Q.—Suppose she **breaks her sheer**, how would you act?

A.—Fill round the main-yard, hoist up the fore-topmast-staysail sheet to leeward, keeping all full on her till she comes back to her sheer again; then haul down the fore-topmast-staysail, and brace the head yard to again.

If she would not lie on that sheer, try her on the other sheer by the rule above.

Q.—You are at anchor in the Downs with the wind at S.W., and it is high water, proceed to swing the ship?

A.—During the last of the flood I would have put the helm hard a-port to cast her inshore; as soon as the tide begins to turn, and the vessel brings the wind on her port bow, I would fill the yards and hoist the fore-topmast-staysail up, lee sheet aft, and put the helm a-starboard. When the tide has acquired its full strength, lay the head yards square, and haul the fore-topmast-staysail down, and keep everything as it is during the strength of the tide. As soon as the tide eased I would fill the head yards and hoist the fore-topmast-staysail up, lee sheet aft.

When the tide is done she will swing head to wind; therefore, as soon as the staysail shakes haul it down, and shift the helm a few spokes a-port, and if it is blowing hard I would point the yards to the wind; if not, I would let them remain as they were, and at high water tend them as before.

**NOTE.**—With the wind between S.S.W. and W.S.W., tend the vessel in the same way; but with the wind exactly S.S.W., or thereabouts, it will be necessary to stand by the helm during the ebb tide, in case the vessel breaks her sheer, and if she would not lie quiet I would steer her.

Q.—Suppose you were **riding** in the Downs, with an **ebb tide, and the wind right aft**, how would you act?

A.—Brace the aft yards forward on the same side as the ship is sheered, brace the fore yard square, and steer as if under way.

Q.—Suppose while you were riding out the ebb tide she **broke her sheer, and brought the wind on her starboard quarter**, what would you do?

A.—Steady the helm, hoist the fore-topmast-staysail up, lee sheet aft, fill all the yards, and steer her until she gets steady on this sheer, then putting the helm a-lee, square the head yards and haul the fore-topmast-staysail down and stand by the helm the remainder of the tide; if the vessel will not lie quiet, steer her.

Q.—State how you would place a ship to **leeward of her anchor with the wind on the quarter and weather tide?**

A.—After the vessel has dropped astern as far as her chain will let her, back all her yards, and let her drop to leeward, then give her a **sheer from her anchor**.

Q.—Suppose the **wind comes on the beam**, what would you do?

A.—Point the main yards into the wind.

Q.—The wind still heads your ship; it is now on her bow?

A.—Bring the main yards still into the wind, the fore yards just by, and ease up the sheer.

Q.—The wind draws **right ahead**, how will you act?

A.—Give the ship a sheer, and let her drop astream, then bring the fore yards forward on one side and the main yards on the other side. The after yards should be brought forward on the same side as her head is sheered to.

Q.—The wind still right ahead, what would you do when the tide eased? Prepare ship for the next tide.

A.—Give the ship a broad sheer by means of the helm, then bring the after yards into the wind and the fore yards aback, hoist the staysail weather sheet aft, which will pay the ship's head off; keep the after yards on the wind as she goes round, and when the staysail, &c., has no effect change the sheet, fill on everything, and let her come up to her position.

Keep the yards as full as is necessary to keep her in her position, which will be to leeward of her anchor, head into the tide, and sheered from the anchor, which is off the starboard quarter.

Q.—**A laden ship to leeward of her anchor**, riding the weather tide, and straining at her cable, what would you do?

A.—Slack out more cable.

Q.—Is there anything else you could do?

A.—Fill on everything, hoist fore-topmast-staysail, with the lee sheet aft, and sail the ship up in the tide, with a man to steer her as if under way.

Q.—Is there anything else that can be done?

A.—Sail the vessel over to windward.

Q.—State how you will place her to windward?

A.—Point her yards into the wind, ease up her sheer and let the ship drop astream; then fill upon everything, hoist the fore-topmast-staysail lee sheet aft, put the helm down, and sail her up into the tide to windward of her anchor.

Q.—Having got your vessel to windward of her anchor, how will you place her when there?

A.—The after yards full, fore yards by, and sheer from her anchor.

Q.—Prepare to swing the ship to windward?

A.—Before the tide eases give the vessel a broad sheer, then fill upon everything, hoist the fore-topmast-staysail, lee sheet aft; at slack water the ship will swing across her cable and come round head to wind; then down staysail, put the helm amidships, and brace all the yards into the wind as far as possible.

When the lee tide makes the vessel will swing head to tide, lay her with the yards in the wind, and a sheer from her anchor.

Q.—Why do you hoist the fore-topmast-staysail ?

A.—To keep the ship ahead of her anchor with a taut cable.

Q.—You are **riding weather tide in a laden ship and she broke her sheer**, what would you do ?

A.—Fill the yards and set the fore-topmast-staysail lee sheet aft to work her back again ; when back lay the yards as before.

Q.—She **breaks her sheer** again, and is troublesome ?

A.—Work her back as before and get her across to leeward of her anchor, and steer her as if under way.

A ship should, as long as it is practicable, be kept to leeward of her anchor. If, when blowing hard, she has been kept to windward during the strength of the tide, she should be sheered to leeward as soon as it slackens. In bad holding ground the sheer should be against the rise of the ground, without reference to the wind, as long as the tide runs with any strength. If, on the weather tide, that is, with the wind against the tide or on the ship's quarter, she forges ahead and brings the buoy on the weather quarter, she is safe enough as long as it can be kept there ; but the danger of this position is in case the wind freshens her head may fly off from the wind bringing it on the other quarter, and, in consequence, make a long and dangerous sweep to leeward ; therefore the fore-topmast-staysail must not be set too soon, and if the yards have been pointed to the wind, the after yards should be braced round and kept full, so that if the wind does come upon the other quarter they may be pointed.

Sometimes a laden ship will not keep in this position without frequently breaking her sheer, and it is in this case that tending to windward becomes necessary—a very troublesome manœuvre, and one where it is always requisite to have more canvas than the fore-topmast-staysail. If, when the buoy is on the weather quarter, a sufficient strain has been on the cable to warrant the supposition that the anchor has been slued to leeward, she can be set to windward with the yards and staysails without coming again astream of the anchor ; but, if the chain has not been very taut, it is always better to watch a lull, and set her to windward when astream of it. If this cannot be done, and she still keeps ahead of the chain, she may be set to windward, but while there care must be taken that she does not drop astream of it ; and when the lee tide makes, she should at first get a broad sheer to leeward to insure the anchor being drawn properly round, and afterwards sheered to windward, if necessary.

If, while riding on the weather tide and sheered to windward, the vessel forges ahead and brings the buoy on the lee quarter, sufficient canvas must be kept set to keep her ahead of the buoy, lest by dropping astream and falling to leeward, the bight of the chain be thrown round the upper fluke of the anchor. In light winds and slack tides the anchor is not drawn round at all, therefore care must be taken to swing the ship always on the same side of it, so that if, while riding on the weather tide she was sheered and tended to windward, it becomes necessary to tend her again to windward when the lee tide ceases—a thing that is very difficult to do ; if the wind is much across she must be shot across the tide to windward, with the main and fore-topmast-staysails, assisted by the jib and other fore-and-aft canvas, if necessary, and kept there till the weather tide makes. Except in light winds, it is not always prudent to sight the anchor very often, for in some places it is a chance whether or not it will take hold again, so that all attention should be paid to the tending or swinging of the ship.

Q.—Supposing it had **blown hard during the strength of the flood tide**, and you paid out a lot of cable ; **towards high water it falls calm**, how would you keep the ship clear of her anchor ?

A.—I would heave short.

Q.—How would you **tend a ship** at anchor in the Downs, wind W. by S., tide high water?

A.—I should have been riding out the whole of the flood tide with my yards aback, fore-topmast-staysail up, weather sheet over, and helm hard a-starboard. When the tide is done she will swing head to wind; therefore, as soon as the staysail shakes haul it down, turn the yards round and shift the helm, and, when the wind is well off the port bow, hoist the staysail up again, weather-sheet over, and keep everything as it is during the whole of the ebb tide. At low water she will swing head to wind, therefore haul the staysail down as soon as it shakes, turn the yards round, and shift the helm; and when the wind is well off the starboard bow hoist up fore-topmast-staysail again, weather sheet aft, and keep everything as it is during the flood tide; at high water tend her as before.

NOTE.—With the wind between W. and S., and N.W. by N., tend her in precisely the same way.

Q.—Your ship is lying in Sea Reach with her head North and the wind N.W., and the **weather tide makes**, what would you do to swing the ship clear of her anchor?

A.—Hoist the fore-topmast-staysail, haul aft the starboard sheet, putting the helm to starboard so as to shoot the vessel across the tide bringing the buoy on the starboard quarter, and as the tide makes she will drop astream of her anchor. As the tide strengthens care must be taken to ease the helm.

Q.—The tide has made, and, the wind being stronger than the tide, your vessel will not drop astern of her anchor; the buoy is on her port quarter, how would you keep her clear of her anchor?

A.—Put the helm a little a-port, keep the fore-topmast-staysail up, brace the fore-yard square and the after yards to the wind, and watch that she did not break her sheer.

Q.—When is the **helm of no use**?

A.—When the ship has no way, and in motionless water.

Q.—You are lying out in the S.W. part of the Downs, what means would you adopt to ascertain when your vessel is drifting?

A.—By putting the deep-sea lead over the side and have a hand to attend to it.

Q.—Suppose you are **riding in a calm**, how would you **keep the ship clear of her anchor**?

A.—By heaving her dead short.

Q.—Your ship is **riding leeward tide, the wind veers aft**, how would you act?

A.—After the wind has veered aft the ship would be riding weather tide, and I should act accordingly.

Q.—Your ship is **riding weather tide, the wind draws a-head**, what would you do?

A.—After the wind had drawn ahead the ship would be riding leeward tide, and I should act accordingly.

## DIAGRAMS TO ILLUSTRATE MANAGEMENT OF SHIPS AT SINGLE ANCHOR.

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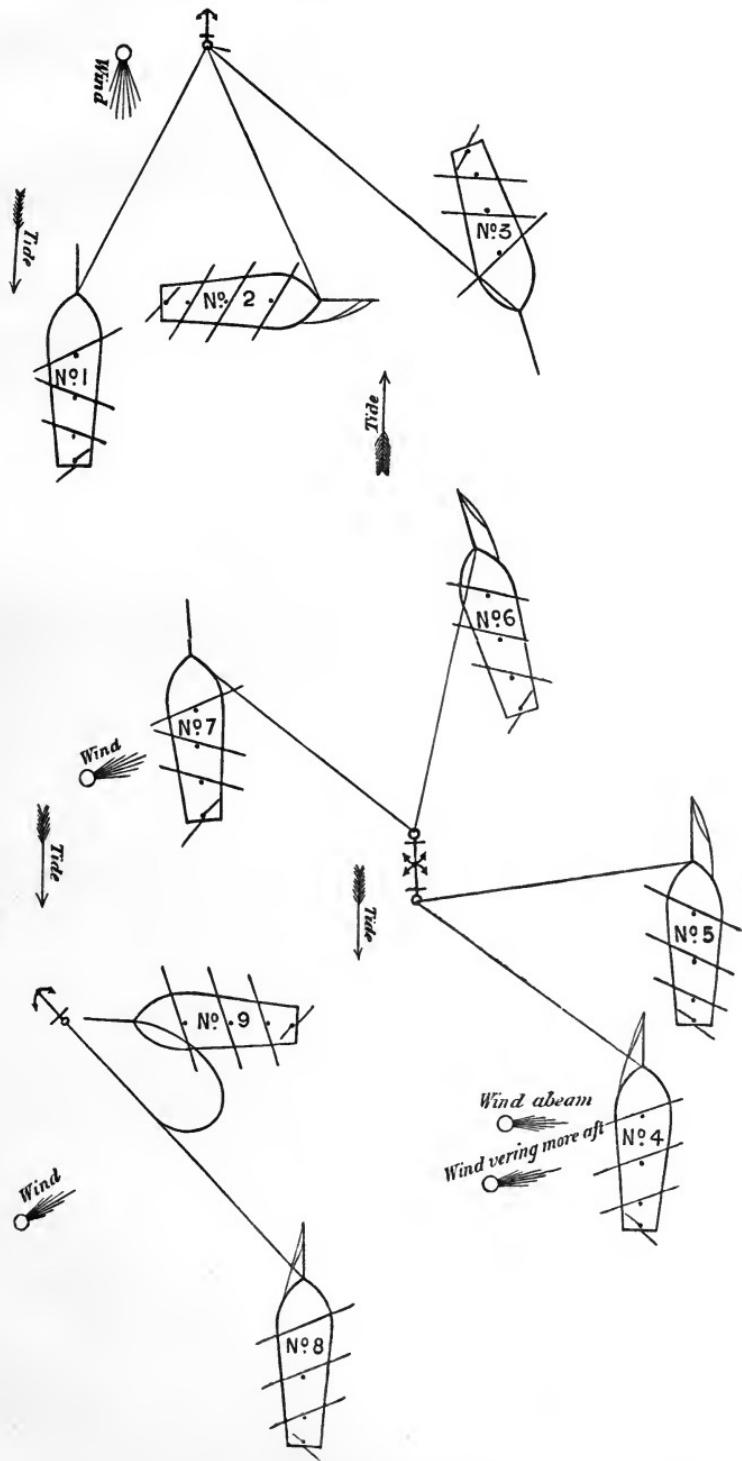
Fig. I represents a ship lying head to wind and tide, in which case all that is required is to give her a slight sheer to keep her steady.

Fig. II.—This is the same ship swinging when the weather tide begins to make—the first of the tide having taken her on the starboard quarter, and canted her with the port side to the wind. As soon as she begins to cant set the fore-topmast-staysail-sheet to windward; when she brings the wind ab aft the beam, let the staysail sheets draw and brace all yards forward, and steer her taut ahead of her anchor; when the wind comes aft or on the starboard quarter, bring her to gradually with the starboard helm, haul down the staysail, brace the head yards by, and put the helm hard a-starboard. She will then be in the position indicated by Fig. III.

Fig. III.—Riding weather tide with the wind on the port quarter and the anchor on the starboard quarter. If the first of the tide had taken her on the port quarter she would have to be forged ahead with the wind on the starboard side, in which case she would lie with the helm a-port on the opposite side of the anchor to No. I. When the weather tide slacks, set the fore-topmast-staysail, and tend the helm, keeping her taut ahead of her anchor until she resumes the place of No. I again. On the lee tide haul down the staysail when she comes head to wind.

Fig. IV has anchored with the wind blowing across the tide, and a shoal on her starboard side. The rule is—when the wind is before the beam the ship lays to leeward of her anchor, and when the wind is abaft the beam she lays to windward of her anchor. In the case of No. IV the wind is right abeam, in which case a ship is usually laid to leeward with the yards all braced aback, and the staysail set with the sheet to windward; there is also a shoal near her, and the rule in that case is to sheer towards the danger if the ship will lie that way, so that if she breaks her sheer she may go from the danger. But if a ship is riding near a shoal on the lee tide it is safer to sheer from the danger, lest the combined force of wind and tide should start the anchor and drive her on the shoal. In the case of No. IV, and the wind veering aft, the ship must be set ahead of her anchor by filling the yards and hauling the lee-staysail sheet aft, and steering her taut ahead of her anchor through the positions of Nos. V and VI until you get her laid to windward in the position of No. VII.

If No. IV should not be set ahead when the wind veers aft, she will break her sheer, and perhaps foul her anchor. See Nos. VIII and IX. The same thing will happen with No. III if the wind should haul on the starboard quarter, unless she is set ahead and laid at the opposite side of her anchor as soon as the wind begins to change.



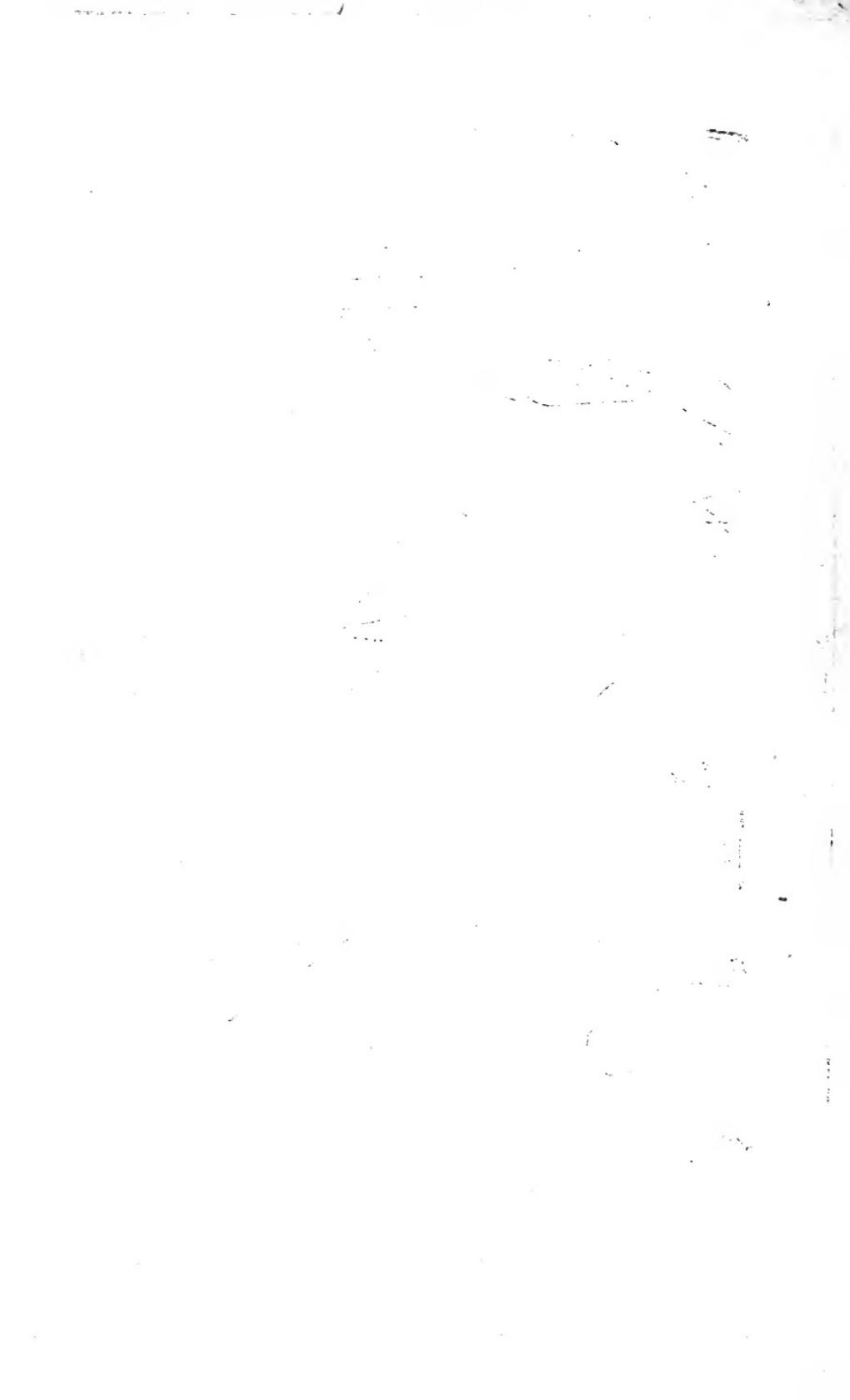


Fig. VIII represents a ship in the same position as No. IV, with the wind veering aft. No. IX is the same vessel just after she has broken her sheer. In this case a ship goes across to the opposite side of her anchor, and must be kept there by changing the helm to leeward, and hauling the main yard forward, keeping the fore yard braced by. In all cases the mizzen yards are laid the same as the main yard.

When a ship is riding on a weather tide in blowing weather, she should be very carefully watched lest she should break her sheer and foul her anchor, or break the chain. The mate should be called immediately whenever the wind changes; and when the tide slackens he should be called before the ship begins to cant, or else he will be too late to manœuvre the ship properly in swinging.

In moderate weather a ship will often require more sail than the fore-topmast-staysail to take her across clear of her anchor; in these cases the jib and main-topmast-staysail should be set.

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## SHIP'S LOG BOOK.

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Q.—What entries do you make in the ship's log while in harbour?

A.—All matters having any reference to cargo, employment of crew, position of ship, and state of the weather.

Q.—What entry would you make in your log after anchoring?

A.—The time, depth of water, which anchor is down, how many fathoms of chain is out, bearing of marks, and the state of the weather.

Q.—What entries would you make day by day at sea?

A.—All matters having any reference to the ship's position, as soundings, bearings and distances of fixed objects, the courses steered and distances run, winds and weather, latitude and longitude by observation and dead reckoning, sail made or taken in, and generally the work done by the people, *and how many inches of water you found in the pump-well, and that you pumped it out.*

Q.—You have a perishable cargo, it is bad weather, what must you do, and what entries would you make in your log book?

A.—Be careful to pump the ship and note the facts, thus:—"Ship labouring in a heavy sea, straining severely, shipping a great deal of water." Pumps sounded (so many) inches of water in them.

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## MISCELLANEOUS QUESTIONS, MATE'S DUTIES, &c.

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Q.—What would you do on first joining a ship as mate?

A.—Report myself to the master if he is on board.

Q.—What then?

A.—Have a general overhaul of all standing and running gear, especially such parts as are liable to be chafed. Have the chafing mats off, and renew them where necessary. If there is time, rouse up the chain cables, and see that the ends are properly stoppered, and that there are no faulty links nor worn shackle bolts.

Q.—For the safety of the ship and crew, what precautions are necessary before leaving the docks to proceed to sea?

A.—See that the hatches are well battened down and spars secured, the decks cleared up; that the anchors are hanging in tackles ready to put over the bow as soon as the ship gets out of dock; have the steering gear in order, and ready for use, compasses shipped, anchors ready and chains ranged, steam whistle and fog horn, side, anchor, and binnacle lamps ready, log and lead lines in order, life buoys in their places, boats with their gear properly stowed, keeping one ready for carrying out a warp, if necessary; that the tow-ropes and some spare lines were at hand ready for use, and take the draft of water fore-and-aft.

Q.—Where would you be stationed in going to sea, and why?

A.—At the bows, to let go an anchor at a moment's notice, if required.

Q.—What trim would you put your ship before entering a dry dock?

A.—Six inches by the stern.

Q.—What is the length of the chain cable?

A.—120 fathoms.

Q.—What are the uses of the stay-pin in the links of a chain cable?

A.—Without them the cable would become full of kinks, and were they removed the links would also collapse.

Q.—Which end of a chain is shackled to an anchor?

A.—That end is shackle to the anchor which brings the bolt of the shackle and the cap of the swivels aft; otherwise they will catch in the bitts in running out.

Q.—In securing the cable to the mast why is an outside clinch used?

A.—So that in case of having to slip, the chain would not jamb; it also allows the other chain to be shackled to it if required.

Q.—How would you measure the size of it?

A.—By taking the *diameter*.

Q.—How do you measure a rope?

A.—By taking the *circumference*.

Q.—Suppose you **come on deck to relieve watch**, what will you enquire after or do?

A.—Having received the course, sail set, account of weather, and orders for the night relative to reports, or calling the captain, I would ascertain when the ship was pumped out, see the look-out placed, and, if at night, see that the lights are all right, and keep a good look-out myself. See that the helmsmen, in relieving each other, do not give up the wheel until the ship is steady on her course; that the wheel ropes are clear, and if running before a gale, that the relieving tackles are hooked and sufficiently overhauled to allow of the helm going hard over either way, taking care that the blocks of the relieving tackles are placed so as not to be jammed under the tiller; and the life-buoys are clear for letting go, and boat's falls ready.

Q.—At sea; a gale of wind has been blowing for the last few days and has now passed off, what would you do?

A.—Examine everything aloft to see if anything is chafed, &c., and sound the pumps.

**NOTE.**—The mate and carpenter examine the spars, and second mate looks after the running gear.

Q.—If the main yard is sprung where is the most likely place?

A.—In the quarter of the yard just outside the truss band.

Q.—What kind of spring would you expect?

A.—A small crack in the after or lower part of the yard-arm and along the yard.

Q.—What are the mate's duties with respect to the receipt and discharge of cargo?

A.—To take account of cargo as it comes on board, or is discharged; and to give receipts to persons who bring it, and get receipts from those who take it away.

Q.—What clause would you insert in the receipts you give for cargo?

A.—“This receipt to be null and void when bills of lading are signed.”

Q.—Taking in cargo from lighters, they come off irregularly, what would you do?

A.—Note the time that one finished, and the time the next commenced.

Q.—What would you do on receiving the goods from the lighter?

A.—Keep tally, and if all is right sign one of the boat notes brought off by the man in charge and keep the other.

Q.—You are discharging cargo into a lighter?

A.—Get a receipt from the man in charge of her.

Q.—Some of the goods sent off to you are in a damaged state?

A.—Call the master's attention to them before giving a receipt, so that he may use his discretion about receiving them.

Q.—Suppose any part of the cargo to be slightly damaged, such as marks defaced on a package, hoops off a butter cask, &c.?

A.—Note the fact on the receipt given to the person who brought the cargo.

Q.—If the damage be serious?

A.—Refuse to take it in; call the master's attention to it.

Q.—The master signs bills of lading in the belief that the mate's account is correct, what would you do, or otherwise, in order that you may keep a correct account?

A.—Attend to nothing else, but keep account while taking in cargo or discharging it.

NOTE.—The mate should be careful to take the marks and numbers of the goods, and note them in the cargo book.

Q.—A cartload of goods are laid on the quay alongside of your ship, you give a receipt to the cartman for them, who is then responsible for them?

A.—My owner.

Q.—You go some distance from the ship for a raft of timber, or a lighter of grain, and you give receipts for the goods, who is then responsible for them?

A.—My owner.

Q.—What is your duty with reference to these goods?

A.—To take every care of them and get them on board as soon as convenient.

Q.—What is your duty with respect to purchases for the cargo?

A.—To have all purchases and everything connected with taking in or discharging cargo in good order.

Q.—Coming on deck to relieve the watch at night, what are the first things you would do?

A.—First see that my side lights are burning bright; next, who is on the look out, then relieve the watch.

Q.—It is your watch, what would you do?

A.—Pay particular attention to the master's orders. Keep a good look-out myself, and see that others do the same. Be particular with the pumps. At night time be very careful to have the ship's lights in order.

Q.—What is the **second mate's duty** when in charge of the **anchor watch**?

A.—See that the anchor light is burning bright, that the watch were keeping a good look-out, and call the mate or pilot when the ship swings, if ordered to do so, and to be sure that the ship is not driving.

Q.—As **mate** of the ship, what **precautions** would you take **when riding at single anchor**?

A.—Leave orders to be called when the tide slackens, so that I may be sure the ship swings clear of her anchor.

## REVOLVING STORMS.

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### QUESTIONS RELATING TO CYCLONES OR REVOLVING STORMS COMMON IN TROPICAL SEAS.

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An Applicant for a FIRST MATE'S and MASTER'S CERTIFICATE for Foreign-going vessels must answer in writing, on paper supplied to him by the Examiner, the following questions, numbering the answers to correspond with the questions.

#### QUESTION.

1. The direction of wind in a Cyclone being\* .....  
state the probable bearing of its centre from the ship in the\* ..... Hemisphere.
  2. And suppose that the wind during the passage of the same Cyclone were found to change towards the\* ..... what would be the ship's position with reference to the line of progression of the centre of the Cyclone, and what action would you take ?
  3. Under what conditions would the change in the direction of the wind in the Cyclone be the reverse of the above ?
  4. What are the usual indications of a ship being on the line of progression of the centre of a Cyclone ?
  5. What are the usual indications that a ship is (a) approaching the centre of a Cyclone ; (b) receding from it ?
  6. Describe the track usually taken by Cyclones in the† ..... , and state the seasons of the year in which they most frequently occur in that region.
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#### PAPER No. I.

1.—The direction of the wind in a Cyclone being South, state the probable bearing of its centre from the ship in the Northern Hemisphere ?

A.—In the Northern Hemisphere the centre bears from 8 to 10 points to the right of the direction of the wind ; therefore, the centre will bear from West to W.N.W.

2.—And suppose that the wind during the passage of the same Cyclone was found to change towards S.W., what would be the ship's position with reference to the line of progression of the centre of the Cyclone, and what action would you take ?

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\* These spaces to be filled in by the Examiner, and frequently varied.

† The Examiner to fill in whether "North Atlantic," "Bay of Bengal," "China Seas," "Indian Ocean," &c.

A.—The wind veering to the right the ship would be in the right-hand semicircle. I would sail her with the wind on the *starboard* side until in a safe position, and then, if need be, heave-to on the starboard tack. Should the barometer again fall, sail her, as before, further out.

3.—Under what condition would the change in the direction of the wind in the Cyclone be the reverse of the above?

A.—The change in the direction of the wind would be the reverse of that given above, if the ship were on the opposite side of the line of progression, or travelling faster than the storm on the same side and in the same direction.

4.—What are the usual indications of a ship being on the line of progression of the centre of a Cyclone?

A.—Barometer falling, wind increasing, blowing in the same direction, sea rising, weather threatening.

5.—What are the usual indications that a ship is (*a*) approaching the centre of a Cyclone? (*b*) receding from it?

A.—(*a*) Barometer falling, wind increasing in force with sudden changes, sea becoming cross and dangerous, weather more threatening. (*b*) Barometer rising, wind decreasing in force and shifting at longer intervals, sky clearing, sea still cross and dangerous, less threatening appearance of weather.

6.—Describe the track usually taken by Cyclones in the North Atlantic, and state the seasons of the year in which they most frequently occur in that region?

A.—They originate a few degrees North of the Equator, about  $10^{\circ}$  or  $12^{\circ}$  N. latitude, and from  $40^{\circ}$  to  $60^{\circ}$  W. longitude, then travel to W.N.W. and N.W. towards the West India Islands, when they recurve to the North, and then N.N.E. and E.N.E., gradually increasing in diameter until they become expended and break up.

Seasons—July to October. Worst months—August and September.

## PAPER No. II.

1.—The direction of the wind in a Cyclone being East, state the probable bearing of its centre from the ship in the Southern Hemisphere?

A.—The centre bears from North to N.N.W.

2.—And suppose the wind during the passage of the same Cyclone was found to change towards the S.E., what would be the ship's position with reference to the line of progression of the centre of the Cyclone, and what action would you take?

A.—Wind veering to the right; therefore the ship is in the *right-hand* semicircle. I would sail her with the wind on the *port* side until in a safe position, and then, if need be, heave-to on the starboard tack. Should the barometer again fall, sail her as before, further out.

3.—Under what condition would the change in the direction of the wind in the Cyclone be the reverse of the above?

A.—See Answer to same Question, Paper No. 1.

4.—What are the usual indications of a ship being on the line of progression of the centre of a Cyclone?

A.—See Answer to same Question, Paper No. 1.

5.—What are the usual indications that a ship is (*a*) approaching the centre of a Cyclone? (*b*) receding from it?

A.—See Answer to same Question, Paper No. 1.

6.—Describe the track usually taken by Cyclones in the Indian Ocean, and state the seasons of the year in which they most frequently occur in that region?

A.—They originate in  $10^{\circ}$  to  $12^{\circ}$  S. and proceed towards the W.S.W. and S.W., recurring in about  $25^{\circ}$  S. latitude to South, S.E., and sometimes to E.S.E. Cyclones near the Mauritius go towards the S.W.

Seasons—December to April. Worst months, February and March.

The following are the *tracks, and seasons of storms* required for the examinations of *Masters and Mates*.

1.—**West Indies and North Atlantic.**—Those Cyclones originate in  $10^{\circ}$  to  $12^{\circ}$  N. Latitude, and from  $40^{\circ}$  to  $60^{\circ}$  W. Longitude, and then proceed to W.N.W. and N.W. towards the West India Islands, where they recurve to the North, and then N.N.E. and E.N.E., gradually increasing in diameter until they become expended and break up.

Seasons—July to October. Worst months, August and September.

2.—**North Pacific.**—Originate in  $10^{\circ}$  to  $12^{\circ}$  N. Latitude and various Longitudes, and travel W.N.W. and N.W., recurring in about  $20^{\circ}$  to  $25^{\circ}$  N. Latitude to North and N.E.

Seasons—July to October. Worst months, August and September.

3.—**South Pacific.**—Originate in  $10^{\circ}$  to  $12^{\circ}$  S. Latitude, and proceed W.S.W. and S.W., recurring in  $25^{\circ}$  S. to South and S.E.

Seasons—December to April. Worst months, February and March.

4.—**Indian Ocean.**—Originate in  $10^{\circ}$  to  $12^{\circ}$  S. Latitude, and proceed towards the W.S.W. and S.W., recurring in about  $25^{\circ}$  S. to South, and sometimes to E.S.E. Cyclones near the Mauritius go towards the S.W.

Seasons—December to April. Worst months, February and March.

5.—**Arabian Sea.**—From the neighbourhood of the Laccadive Islands they travel about W.N.W., curving northerly towards the Arabian coast. Cyclones not frequent.

Change of the Monsoons—April, May, June, August, September, and October.

6.—**Persian Gulf.**—Southerly and S.W. winds prevail in November, December, and January, and N.W. winds during the remainder of the year.

7.—**Red Sea.**—The wind blows from the Southward from September to May, and generally North and N.N.W. the remainder of the year.

8.—**Malabar Coast.**—Tracks up along shore to the N.N.W.

Change of Monsoons—April, May, June, and August, September, October.

9.—**Bay of Bengal.**—Originate near the Andaman Islands, some travel westward towards the Madras coast, others take a more Northerly course to N.W. and N.N.W., until spent among the Low Islands at the head of the Bay.

Seasons—May, June, September, October, and November. Worst months, October and November.

10.—**China Sea.**—Originate near the Phillipine or Bashee Islands; travel between W.N.W. and W.S.W. towards the China Coast; some go more North or South.

Seasons—May to November. Worst months, August, September, and October.

11.—**Japan Sea.**—Come in from the Pacific, travelling W.N.W. or N.W., recurring on the coast to the Northward.

Seasons—May to November. Worst months, August, September, and October.

## MASTER'S EXAMINATION.

### CHART.—ADDITIONAL.

#### TO BE WRITTEN.

6.—What do you understand those small numbers to indicate that you see placed about the Chart, and at what time of tide?

A.—The depth of water in feet or fathoms at low water of ordinary spring tides.

7.—What do the Roman numerals indicate that are occasionally seen near the coasts and in harbours?

A.—The time of high water at that place at full and change of the Moon.

8.—How would you find the time of high water at any place, the *Admiralty Tide Tables* not being at hand, nor any other Tables available?

A.—To the time of high water at full and change add 49 minutes for every day elapsed since full or change; the result is the P.M. time of high water.

Or thus:—To the time of the moon's meridian passage add the time of high water at full and change; the sum is the P.M. time of high water.

## DEVIATION OF THE COMPASS.

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1.—State briefly the essentials of an efficient compass?

A.—In an efficient compass the card should be fitted with two or more needles—short ones preferable—with great directive power, and fitted with a chrysolite, sapphire, or ruby cap, truly balanced, and of the least possible weight. The centre pin should be fine and smooth—the top of which must be on a line with the centre of the pivots. The bowl should be made of brass or pure copper, fitted with sights, and free to move with the motion of the vessel.

2.—State briefly the chief points to be considered when selecting a position for your compass on board ship, and what should be particularly guarded against?

A.—Select a place amidships, having a clear view all round for taking bearings, at least four or five feet from all iron—such as beams, frames, stanchions, and bulkheads. I should particularly guard against all vertical iron, such as funnels, davits, derricks, and ventilators. If electric light is used, the dynamo must be not less than fifty feet from the compass.

3.—What do you mean by deviation of the compass, and how is it caused?

A.—The deflection of the compass needle from the correct magnetic, caused by iron in the ship, either in the construction, equipment, or as cargo.

4.—Describe how you would determine the deviation of your compass: (1) By reciprocal bearings; (2) By figures on the dock walls; (3) By bearings of a distant object; (4) By the bearings of the sun or other celestial body?

A.—(1) A careful observer must go on shore with a second compass, and place its tripod in some open spot, clear of iron or other attraction, and where it can be distinctly seen from the Standard Compass on board; then, by means of preconcerted signals, the mutual bearings of these two compasses from each other are observed, when the ship's head is steady on each of the thirty-two points: (2) Or of some conspicuous object, in a line with figures on a dock wall: (3) Or by the observer on board taking the bearings of a distant object, whose correct magnetic bearing is known: (4) Or by azimuths or amplitudes of the sun or other heavenly bodies. The difference between the magnetic and compass bearing is the deviation.

5.—Having determined the deviation with the ship's head on the various points of the compass, how do you know when it is easterly and when westerly?

A.—When the correct magnetic bearing of the distant object is to the right of the reading of the compass on board, the deviation is easterly; when to the left, westerly.

6.—Why is it necessary, in order to ascertain the deviations, to bring the ship's head in more than one direction?

A.—Because the deviation changes as the direction of the ship's head is altered.

7.—For accuracy, what is the least number of points to which the ship's head should be brought for constructing a curve or table of deviations?

A.—Eight points. The four cardinal, N., S., E., and W.; and the four quadrantal points, viz., N.E., S.E., S.W., and N.W.

8.—How would you find the deviation when sailing along a well-known coast?

A.—By taking, by the Standard Compass, a bearing of two well-defined objects in a line: as, for instance, the bearing of two beacons, two lights, two points of land—not too near each other—and whose correct magnetic bearing has been ascertained (from the chart, or otherwise); then the difference between the *correct* magnetic bearing and the compass bearing is the deviation for the direction of the ship's head when the bearing was taken.

9.—Name some suitable objects by which you would readily obtain the deviation of the compass when sailing along the coasts of the channel you have been accustomed to use?

A.—The South Foreland lighthouses in one, bearing W. by N., correct magnetic; Portland lights in one, bearing N.N.W.  $\frac{3}{4}$  W.; Prawl Point and Start lighthouse in one, and Lizard lights in one.

10.—Supposing you have no means of ascertaining the magnetic bearing of a distant object when swinging your ship for deviations, how could you find it—approximately—from equi-distant compass bearings; and at what distance, as a rule, should the object be from the ship?

A.—I would bring the ship's head N. by compass, and take a bearing of the distant object by the same compass, and note this down; then bring the ship's head to N.E., E., S.E., S., S.W., W., and N.W., taking the bearings each time, the mean of these bearings will give the approximate magnetic bearing of the object: the object should be from six to eight miles distant.

11.—**EXAMPLE:**—Having taken the following compass bearings of a distant object, find the object's magnetic bearing, and thence the deviation,

MAGNETIC BEARING REQUIRED: S.  $8\frac{1}{2}$ ° E.

SHIP'S HEAD BY STANDARD COMPASS.	BEARING OF DISTANT OBJECT BY STANDARD COMPASS.	DEVIATION REQUIRED.	SHIP'S HEAD BY STANDARD COMPASS.	BEARING OF DISTANT OBJECT BY STANDARD COMPASS.	DEVIATION REQUIRED.
North ....	S. 4° E.	$4\frac{1}{2}$ ° W.	South ....	S. 13° E.	$4\frac{1}{2}$ ° E.
N.E. ....	South	$8\frac{1}{2}$ ° W.	S.W. ....	S. 23° E.	$14\frac{1}{2}$ ° E.
East ....	S. 4° W.	$12\frac{1}{2}$ ° W.	West ....	S. 21° E.	$12\frac{1}{2}$ ° E.
S.E. ....	S. 1° W.	$9\frac{1}{2}$ ° W.	N.W. ....	S. 11° E.	$2\frac{1}{2}$ ° E.

S. 5° W.

S. 72° E.

S. 5° W.

8) 67Obs mag. bearing S.  $8\frac{1}{2}$ ° E.

S. $8\frac{1}{2}$ ° E.							
S. 4° E.	S. 0° E.	S. 4° W.	S. 1° W.	S. 13° E.	S. 23° E.	S. 21° E.	S. 11° E.
$4\frac{1}{2}$ W.	$8\frac{1}{2}$ W.	$12\frac{1}{2}$ W.	$9\frac{1}{2}$ W.	$4\frac{1}{2}$ E.	$14\frac{1}{2}$ E.	$12\frac{1}{2}$ E.	$2\frac{1}{2}$ E.

12.—With the deviations as above, construct a curve of deviations on a NAPIER's diagram, and give the course you would steer by the Standard Compass to make the following courses correct magnetic.

Magnetic courses .....	S.S.W.	W.N.W.	N.N.E.	E.S.E.
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Compass courses required	S. $13\frac{1}{2}$ ° W.	N. $77\frac{1}{2}$ ° W.	N. 30° E.	S. 56° E.
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13.—Supposing you have steered the following courses by the Standard Compass, find the correct magnetic courses made from the above curve of deviations.

Compass courses .....	W.S.W.	N.N.W.	E.N.E.	S.S.E.
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Magnetic courses required	S. 82° W.	N. 24° W.	N. $56\frac{1}{2}$ ° E.	S. 26° E.
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14.—You have taken the following bearings of two distant objects by your Standard Compass, as above: with the ship's head at W.  $\frac{1}{2}$  S., find the bearings, correct magnetic.

Compass bearing .....	W. by S.		N. $\frac{3}{4}$ W.
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Magnetic bearings required	N. 88° W.	and	N. 5° E.
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15.—Do you expect the deviation to change? if so, state under what circumstance.

A.—Yes; it changes rapidly for several months after the ship is launched; an alteration also takes place by change of magnetic latitude; and in ships running long upon one course and then changing the course, and on steering a course directly opposite to which she was built; by the heeling of the ship, and by taking in a cargo of iron.

16.—How often is it desirable to test the accuracy of your table of deviations?

A.—At every possible opportunity—especially in a new ship or great change of latitude; it is also very desirable to frequently test the course the ship is on.

17.—What is meant by variation of the compass; what is it caused by; and where can you find the variation for any given position?

A.—It is the angle between the magnetic meridian and the true meridain at any place. By the magnetic poles of the earth not coinciding with the geographical poles. We can find the variation by referring to the Admiralty Variation Chart. The variation is always given on the chart used in navigating the vessel, and also by amplitudes of the sun.

18.—The earth being regarded as a magnet, which is usually termed the blue, and which is the red magnetic pole?

A.—The north magnetic pole of the earth is called the blue and the south the red.

19.—Which end of a magnet (or compass needle) is usually termed the red or “marked” end, and which the blue?

A.—The “north seeking pole,” or “marked end,” is called the “red end”—the south the “blue.”

20.—What effect has the pole of one magnet of either name on the pole of another magnet?

A.—Like poles repel, and unlike poles attract each other.

21.—What is meant by transient induced magnetism?

A.—The magnetism of soft iron, induced either by the earth's influence or by the presence of other magnets; when a ship is kept for a considerable time with her head in a direction different from that in which she was built; or if, while so situated, she should be subjected to concussion, a change will take place in her magnetic condition; but this change is very transient in its duration when compared with the sub-permanent magnetism acquired while building.

22.—Which is the red and which is the blue pole of a mass of soft vertical iron, by induction, and what effect would the upper and lower ends of it have on the compass needle: (a) in the northern hemisphere; (b) in the southern hemisphere; (c) on the magnetic equator?

A.—(a) In the northern hemisphere the upper part of a mass of soft vertical iron will be the blue pole, the lower red, and the upper end will attract the red pole of the compass needle; (b) in the southern hemisphere it will be the reverse of the foregoing; (c) when on the magnetic equator it would have no effect on the needles, because it is at right-angles to the line of force.

23.—Describe what is usually termed the sub-permanent magnetism of an iron ship, and state when and how it is acquired; and which is the red and which is the blue pole; and why it is called sub-permanent magnetism?

A.—The sub-permanent magnetism of an iron ship is first acquired from the earth's inductive influence while the ship is being built, but this undergoes a sensible diminution after being launched, especially when she proceeds to sea and is subjected to heavy concussion, with her head in any other direction than it was while being built. But as long as she retains the form of a ship she always retains a certain amount of magnetism, called sub-permanent to distinguish it from the magnetism of steel magnets. The red sub-permanent pole of the ship is that which was directed towards the blue or north magnetic pole of the earth, and the opposite extremity of the ship is the blue sub-permanent pole.

24.—Describe the meaning of the expression, co-efficient A?

A.—Co-efficient A represents a deviation which is constant in name and amount whatever the direction of the ship's head may be. It has the sign + when easterly, and — when westerly.

25.—Describe the meaning of the expression co-efficient B, its signs and effects.

A.—Co-efficient B represents semicircular deviation due to fore-and-aft magnetic forces. + B represents an attraction towards the ship's head, and causes easterly deviation with the ship's head in the eastern semicircle of the compass, and westerly deviation in the western semicircle, attaining a maximum value on the east or west points, decreasing to zero on north and south points by compass. — B represents the attraction towards the ship's stern, and gives east deviation in western, and westerly in the eastern semicircle—maximum on E. and W., and zero at N. and S. by compass.

26.—Describe the meaning of the expression co-efficient C, its signs and effects.

A.—Co-efficient C represents semicircular deviation due to transverse magnetic forces. + C represents an attraction towards the starboard side of the ship, and causes easterly deviation with the ship's head in the northern semicircle, and westerly deviation in the southern semicircle, attaining a maximum value on the N. and S. points, decreasing to zero on the E. and W. points by compass. — C represents an attraction towards the port side of the ship, and causes W. deviation with ship's head in the northern semicircle, and E. in the southern semicircle, attaining a maximum on N. and S. points, and zero on E. and W. points by compass.

27.—Describe the meaning of the expression co-efficient D, its signs and effects?

A.—Co-efficient D represents quadrantal deviation, due to horizontal induction in soft iron; co-efficient + D gives easterly deviation with the ship's head between N. and E. and S. and W.; and westerly deviation between S. and E. and N. and W. Co-efficient — D gives results directly opposite to + D. Both + D and — D have a maximum value on the four quadrantal points, and zero on the cardinal points by compass. — D seldom occurs in practice.

28.—Describe the meaning of the expression co-efficient E, its signs and effects?

A.—Co-efficient E represents quadrantal deviation, due to horizontal induction in soft iron, unsymmetrically distributed; + E gives easterly deviation with the ship's head between N.E. and N.W., and S.E. and S.W., and westerly deviation between N.E. and S.E., and N.W. and S.W. — E gives results directly opposite to + E.

Both + E and — E have a maximum value on the cardinal points, and zero on the quadrantal points, but are usually small in compasses placed in the middle of the ship.

29.—Would you expect any change to be caused in the error of your compass by the ship heeling over—either from the effect of the wind or the cargo, etc.?

A.—Yes; because the position of the iron about a compass is changed with reference to the earth's magnetic force.

30.—The compasses of iron ships being more or less affected by what is termed the heeling error: On what courses is this error usually at its minimum, and on what courses at its maximum?

A.—Heeling error will be minimum on E. and W., when the disturbing force is in line with the compass needles, and maximum on N. and S. courses, when the the disturbing force is at right-angles to the compass needles.

31.—Describe clearly the three principal causes of the heeling error on board ship?

A.—The heeling error arises, partly from vertical induction in transverse iron and iron vertical to the ship's deck, and partly from the vertical component of the sub-permanent magnetism of the ship. The transverse horizontal iron beams become inclined to the vertical as the ship heels over, having the same sign as vertical iron and drawing the red pole of the compass to one side. The vertical iron to the ship's deck, when she heels over, becomes inclined to the horizontal—then the induced magnetism is less in amount. The poles are at *one side* instead of being *under* the compass, which will draw the red pole of the compass to the high or low side. The vertical component of the sub-permanent magnetism remains the same, but deflects the compass needle when she heels over. The sub-permanent transverse magnetism is corrected by the vertical magnet under the centre of the compass.

32.—State to which side of the ship, in the majority of cases, is the north point of the compass drawn when the ship heels over in the northern hemisphere?

A.—This is caused by the vertical iron and high ends of beams below the compass when the ship heels. The upper ends, being *blue induced magnetism*, attract the red or N. end of the needles to the high side. If the vertical iron near the compass have their upper ends above the compass, the force to the high side is reduced.

33.—Under what conditions—that is, as regards position of ship whilst building, and the arrangement of iron in the ship—is the north point of the compass needle usually drawn to windward—or the high

side of the ship—in the northern hemisphere; and, if not allowed for, what effect has it on the assumed position of the ship when she is steering on northerly, also on southerly courses in the northern hemisphere?

A.—If the ship is built head north there is a strong vertical force acting downwards in the after body of the vessel, having S. (blue) sub-permanent magnetism: this would combine with the vertical induction in transverse iron in attracting the N. (red) end of the needle to the weather, or high side. If this is not allowed for it will take the ship to windward on northerly and to leeward on southerly courses.

34.—Under what condition (as in question 33) is the north point of the compass needle usually drawn to leeward, or the low side of the ship in the northern hemisphere; and, if not allowed for, what effect would it have on the assumed position of the ship when she is steering on northerly—also on southerly—courses in the northern hemisphere?

A.—On the contrary to question 33, a ship built head South, the vertical force acts upwards from the after body of the ship, having N. (red) polarity, and the N. (red) end of the needle, as the ship heels over, is repelled by it to the lee side. This would take the ship to leeward on northerly, and to windward on southerly courses in the northern hemisphere.

35.—The effects being as you state, on what courses would you keep away, and on what courses would you keep closer to the wind in the northern hemisphere in order to make good a given compass course; (a) when North point of compass is drawn to windward, or the high side of the ship; and (b) when drawn to leeward, or the low side?

A.—(a) When the North point is drawn to the high side in the northern hemisphere I would keep away on northerly courses, but keep close to the wind on southerly courses. (b) When drawn to leeward, keep close to the wind on northerly courses, and keep away on southerly courses.

36.—Does the same rule hold good in both hemispheres with regard to the heeling error?

A.—No; the above rules are generally reversed in the southern hemisphere; but it is recommended, in order to determine it, that observations be made in every ship.

37.—State clearly how that part of the heeling error due to the permanent part of the magnetism of the ship varies as the ship changes her position on the globe, and what is the reason of this?

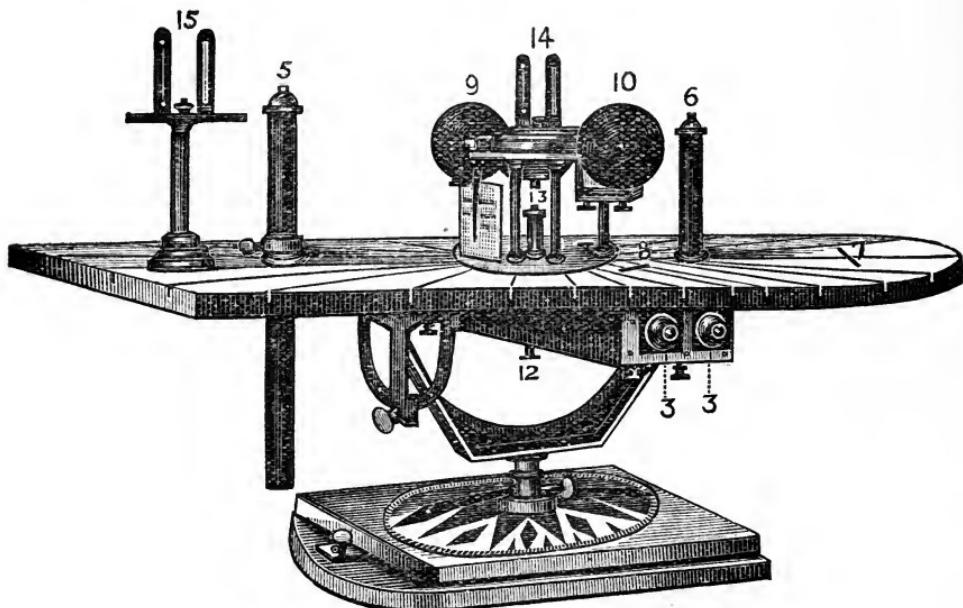
A.—The heeling error due to the permanent parts of the magnetism varies inversely as the earth's horizontal force, and, consequently, is greatest in high latitudes, diminishes as the ship approaches the magnetic equator, and increases again, still retaining the same name, as the ship recedes from the magnetic equator in the southern hemisphere.

38.—State clearly how that part of the heeling error due to the induction in transverse iron (which was horizontal when the ship was upright) and iron vertical to the ship's deck varies as the ship changes her position on the globe.

A.—The heeling error due to transverse and vertical soft iron decreases as the ship approaches the magnetic equator, where it is zero, and is of a contrary name in the southern hemisphere. This is caused by induced magnetism in the upper ends of beams and all transverse iron, and of the same name as vertical to the deck in both hemispheres, which will attract the N. end of the compass needle to the high side in the northern, and to the low side in the southern hemisphere.

39.—Your steering compass having a large error, show by “BEALL’s Compass Deviascope” how you would correct it by compensating magnets and soft iron (as usually practised by compass adjusters in the Mercantile Marine) in order to reduce the error within manageable limits. Show also how the heeling error can be compensated?

A.—The examiners now expect the candidate to have a practical knowledge of the method of adjusting compasses, &c., and for this purpose Capt. BEALL’s Compass Deviascope is used.



The deviascope is the model of a ship's deck so adapted as to revolve horizontally over a compass painted upon the stand, and which is intended to answer the purpose of a dumb card. The model can also be heeled to port or to starboard to any required angle.

On the deck is a binnacle with compass, fitted with a number of other appliances, such as small magnets, iron bars, &c., all of which are seen numbered in the figure (see figure). Radiating in different directions from the point on the deck, directly under the centre of the compass, are 32 grooves cut into the deck for the reception of a magnet, and thus, with the aid of transverse iron beams, the model takes the

characteristics of an iron ship. The fore-and-aft line and the 'thwartship line crossing under the compass on deck are a guide in placing the magnets. Nos. 3 and 3 are two soft iron beams to represent 'thwartship beams of an iron ship, producing quadrantal deviation. No. 5 is a soft iron bar representing the stern-post, or the vertical iron of an iron ship. No. 6 is what is known as a Flinders bar for compensating the error of the compass caused by vertical iron generally. Nos. 7 and 8 are small deck magnets for compensating the *semicircular* deviation; and 9 and 10 are soft iron balls for compensating *quadrantal* deviation. Nos. 11, 12, and 13 are to be used for the heeling experiments. No. 11 is a brass tube inserted from underneath the deck, and screwed into the bottom plate of the binnacle. No. 12 is a holder (with magnet) to be inserted into the brass tube (No. 11) to produce heeling error; and No. 13 another magnet to compensate the same. No. 14—Azimuth "sight vane." No. 15 is a small "Pelorus," or dumb card. There is a clinometer on the front of the binnacle to show the angle of heel.

40.—As the co-efficient B (capable of being corrected) usually consists of two parts, one due to the permanent magnetism of the ship, and the other to vertical induction in soft iron, how should each of the two parts, strictly speaking, be corrected when compensating the compass?

A.—The co-efficient B consists of two parts, viz., permanent magnetism, and induced magnetism in soft iron; the former is compensated by permanent magnets, and the latter by a soft iron bar either before or abaft the compass.

41.—If the whole of the co-efficient B be corrected by a permanent magnet, as is usually done, what is likely to ensue as the ship changes her magnetic latitude?

A.—+ B or — B, resulting from induced magnetism in vertical iron, changes with a change of latitude. It cannot, like sub-permanent magnetism, be compensated by a permanent magnet, because the magnet retains the same influence in both hemispheres. It would be over compensated in a less latitude, and under compensated for a higher latitude.

42.—Provided the needles of your compass are not so long and powerful and so near as to cause the soft iron correctors to become magnetised by induction, would the co-efficient D, if properly compensated, be likely to remain so in all magnetic latitudes and both hemispheres? If so, state the reason why.

A.—When once the co-efficient D is properly corrected by soft iron it is correct for all magnetic latitudes, provided the distribution of the iron in the ship is not materially changed, and provided the magnetism of the soft iron has not been affected by the compass needles. The magnetic force of the earth is the directing force acting on the needles, the induced magnetism of the horizontal soft iron is the disturbing force acting on the needles; the intensity of the latter force varies as

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that of the former, and, therefore, the ratio between the two forces being always the same, the effects produced remain the same.

43.—State at what distance, as a general rule, the magnets and soft iron correctors should be placed from the compass needles, and what will be the consequence if they are placed too near the needles?

A.—Magnets should never be nearer than 12 inches from the needles, and soft iron correctors not nearer than  $1\frac{1}{4}$  the length of the needles from the centre of the card; if nearer than this they will become magnetised by induction, and, consequently, the adjustment would be imperfect.

44.—Is it necessary that the magnets used for compensating coefficients B and C should be placed on the deck? If not, state where they may also be placed, and the rules to be observed in placing them into position.

A.—It is not necessary to place the magnets on the deck. A better plan is to place them inside the binnacle, and so arranged as to be easily raised or lowered, as required in adjusting. The rule to be observed is—the centre of the magnets must be on the centre lines passing through the binnacle. It is not expedient to place the correcting magnet bar within twice its length from the compass needle.

45.—Can the compensation of the heeling error be depended upon when the ship changes her latitude? If not, state the reason.

A.—No; the heeling error changes when the latitude is changed to any great extent. Part of this error is due to induced magnetism in transverse and vertical iron, which decreases towards, and increases from, the equator, and of opposite names in both hemispheres, which cannot be corrected for all latitudes with a permanent magnet.

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## NAVIGATING ENGLISH CHANNEL, &c.

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Q.—Coming from the westward, in what latitude would you endeavour to make the channel?

A.—The best parallel for entering the channel is between  $49^{\circ} 15'$  and  $49^{\circ} 25'$ , according to the inclination of the wind; because it is between these limits that the relative situation of my vessel can with the greatest certainty be ascertained, as well in respect to depth of water as to quality of ground (or to the distinction between the ooze and sand), and which cannot be so well defined in any other latitude. The keeping on this parallel is rendered still more necessary in consequence of the *rotary* motion and *northerly* inclination of the tide to the *westward*, S.W., and *southward* of Scilly. On the parallel of  $49^{\circ} 15'$  and  $49^{\circ} 25'$  the edge of Channel Sands will be found in the longitude  $11^{\circ} 18'$ , and 195 miles from Scilly Islands.

Q.—How do you know when you are on the French coast in thick weather?

A.—By having deep water, with large stones and red sand.

Q.—What soundings do you get in the fairway of the channel?

A.—White sand, small yellow stones, with black specks and broken shells.

Q.—In coming into the channel from the westward in thick weather, how do you know if you are too far to the southward or northward of the fairway?

A.—Red sand and coarse gravel indicate an approach to the French coast; mud and oozy bottom in the stream or to the northward of Scilly; but white sand, with black specks and small shells, in the fairway of the channel.

Q.—Suppose you were coming up channel, and had not seen land, how far would you proceed before heaving-to?

A.—I would proceed no higher than the Start.

Q.—Between what bearings is the Bishop Rock light hidden?

A.—Between the bearings of S.W.  $\frac{3}{4}$  W. and W.  $\frac{3}{4}$  N., except to E. by N.

Q.—How does the Bishop bear from St. Agnes?

A.—W.  $\frac{1}{2}$  S., about  $4\frac{1}{2}$  miles.

Q.—What is the channel course?

A.—E.  $\frac{1}{2}$  S., correct magnetic.

Q.—What are the dangers near the Land's End?

A.—The Runnel Stone, Wolf Rock, Long Ships, and Seven Stones.

Q.—Where is the Wolf Rock?

A.—Nearly midway between St. Agnes and the Lizard.

Q.—Give its bearing and distance from neighbouring lights?

A.—The Wolf Rock lies E.S.E.  $\frac{3}{4}$  E., 21 miles from St. Agnes; 24 miles W.N.W. from the Lizard Point; and S.W.  $\frac{1}{2}$  W., 7½ miles from the Long Ships.

Q.—What are the dangers near the Lizard?

A.—The Stags and Manacles Rocks.

Q.—How do the Lizard lights bear when in one, and what do they lead clear of?

A.—W.  $\frac{3}{4}$  N. and E.  $\frac{3}{4}$  S., clearing the Wolf Rock to the West, and the Manacles to the East.

Q.—Name the principal harbours and roadsteads along the northern coast of the English Channel?

A.—Penzance, Falmouth, Plymouth Sound, Portland, Poole, Solent, Southampton Water, Spithead, Portsmouth, Dungeness, and Downs.

Q.—What is the best mark for rounding the Manacles?

A.—Keep Beast Point open of Black Head W. by S.  $\frac{1}{4}$  S. until the tower of Mawnan Church is well open of Nare Point N. by W.  $\frac{1}{4}$  W.

The light on St. Anthony's entrance to Falmouth, bearing N.N.E., and the Lizard lights open S. of the Beast Head, a safe night mark for rounding the Manacles.

The western lighthouse should be kept open of the eastern one until 1½ miles eastward of them before the above marks can be run on with safety.

Q.—Having rounded the Manacles, proceed to Falmouth outer anchorage.

A.—If only going to the outer anchorage, I would steer up as before directed until within about 2 miles of St. Anthony's; then keep more to the N.W., and anchor as convenient, in 8 or 10 fathoms, with St. Anthony's light about N.E. by E.; the harbour will then be open to me with the wind from the S.E., round southerly and up to N.W.

NOTE.—St. Anthony's *fixed* light kept in sight between N.N.E.  $\frac{1}{2}$  E. and N. by E.  $\frac{1}{4}$  E. also clears the Manacles.

Q.—What dangers are there at the entrance?

A.—The Black Rock.

Q.—On which side would you pass it?

A.—On the East side, because the channel is wider and deeper.

Q.—Where is the Eddystone?

A.—Off Plymouth it bears S.W.  $\frac{1}{2}$  W., 10 miles from the light on the W. end of Plymouth Breakwater; and E. by S.  $\frac{1}{2}$  S., 29 miles from St. Anthony's light.

Q.—What depth of water is there off the Eddystone?

A.—The Eddystone lies in a stream of 39 fathoms.

Q.—What peculiarity is there about the Start?

A.—In the same tower below the principal light another light is shown towards Berry Head, visible only when the Start bears between W.  $\frac{1}{4}$  S. and S.W. by S.

Q.—What are the dangers off the Start?

A.—The Pear Tree Rocks and Skerries. The former of these are partly visible, and lie three-quarters of a mile westward of the Start Point, and a less distance off the Pear Tree Head. The S.W. end of Skerries is a little more than a mile from the Start (N.E. by E.), extending 3 miles in that direction, and terminating in a coarse sandy knoll; the shoal part is about a mile in extent, with 9 feet at low water spring tides, and 12 fathoms close to it.

Prawl Point, open of the Start W.  $\frac{1}{4}$  N. until Berry Head comes open of Down End N.E., clears them on the S. and S.E. sides.

Q.—Which is the narrowest part of the channel?

A.—Between Portland and the Casquets—the Casquets bears from Portland S.S.W.  $\frac{1}{4}$  W., 47 miles.

Q.—What lights are there on the Casquets?

A.—One light, showing *three* flashes in quick succession every half-minute.

Q.—What dangers have you near Portland?

A.—The Race and the Shambles.

Q.—What is the mark for going between the Race and the Shambles in the night?

A.—At night the leading mark is the two lights in one, N.W. by N., until the red light on the breakwater bears N. by E.  $\frac{3}{4}$  E. With a flood tide keep Portland high light a little open to the S.W. of the low light. Between the Shambles and the shore there are from 14 to 16 fathoms.

Q.—Where is the Hanois light?

A.—Off the W. end of the Island of Guernsey.

Q.—What colour is the Needles light?

A.—The light appears white between the bearings of N.W.  $\frac{1}{4}$  N. to E. by S.  $\frac{3}{4}$  S. This northern limit (E. by S.  $\frac{3}{4}$  S.) passes about 4 cables South of the Dolphin Bank, and about 2 cables from the S.W. buoy of the Shingles. Thence the light is red from E. by S.  $\frac{3}{4}$  S. to S.W.  $\frac{1}{2}$  W., and white from S.W.  $\frac{1}{2}$  W. to S.W. by W., showing in the direction of Needles Channel, and clears the Warden Ledge; inside of this bearing to the land the light is green. At the S.W. side of the Isle of Wight, the light is red from N.W.  $\frac{1}{4}$  N. to N.W.  $\frac{1}{2}$  W.; inshore of the latter bearing the light is obscured.

Q.—Where is the Owers lightvessel?

A.—The Owers lightvessel lies in 16 fathoms at low water spring tides, with the following marks, bearings, and distances:—Mixon Beacon N.N.W., westerly; South Spit of Outer Owers N.E. by E.  $\frac{3}{4}$  E., distant  $\frac{6}{10}$  of a mile; East Bank (Eastborough Head) buoy N.E. by N., distant  $3\frac{1}{4}$  miles; Nab lightvessel N.W.  $\frac{3}{4}$  W., distant  $12\frac{1}{2}$  miles.

Q.—What dangers are there off Beachy Head?

A.—The Royal Sovereign and other shoals.

Q.—What marks the Royal Sovereign shoal ?

A.—The Royal Sovereign lightvessel, shows three quick bright flashes every 45 seconds.

Q.—What are the dangers off Dungeness ?

A.—The Varne shoal.

Q.—What dangers are there at the entrance into the Channel from the North Sea ?

A.—The Varne and Ridge, which lie in the fairway of the Channel, with from 16 to 18 fathoms between them.

Q.—What light is on the Varne ?

A.—A lightvessel, showing a red revolving light which attains its greatest brilliancy every 20 seconds.

Q.—What is the bearing and distance of Ushant from St. Agnes' light ?

A.—S.  $\frac{1}{2}$  E., distance 98½ miles.

Q.—And from the Lizard ?

A.—S. by W.  $\frac{3}{4}$  W., 89 miles.

Q.—What kind of set do you guard against in the Channel ?

A.—A set to the southward at ebb and flow.

Q.—What is the cause of that ?

A.—The formation of the English coast line.

Q.—Outside the Channel how does the tide set ?

A.—To the northward, towards the Irish Sea and Bristol Channel.

Q.—In what part of the English Channel do the tides run strongest ?

A.—In the narrowest part of it, that is, between Portland and the Channel Islands.

Q.—When have we the highest tides ?

A.—At full and change of the moon.

Q.—Generally when do we have extraordinary high tides ?

A.—In January.

Q.—What rate would you allow for the in running from Dungeness to the Downs ?

A.—Not more than four knots an hour.

Q.—What is meant by the phrase tide and half tide ?

A.—In some parts of the English Channel there is a six hour shore tide and a six hour tide in the offing. In the offing the stream commences running to the eastward when it is half flood inshore, and continues running to the eastward three hours after high water inshore.

Q.—Does the tide turn sooner inshore or in the stream ?

A.—Inshore.

Q.—How long might you gain upon a tide by attending to this ?

A.—Two or three hours, but much would depend upon the wind and the sailing qualities of the ship.

Q.—What is the general port of reference for the tides in the Channel?

A.—Dover.

Q.—What would you ascertain respecting the tide previous to entering a harbour or port?

A.—The state of the tide and the rise and fall.

Q.—Why?

A.—In order to ascertain the depth at low water.

Q.—How would you find the time of high water at a foreign port?

A.—To the time of the moon's meridian passage—corrected for longitude—*add* the time of high water at full and change of the moon; the sum is the time of high water in the afternoon of the given day.

Q.—How do you find the approximate time of high water by the chart?

A.—To the time of high water at full and change add 48 or 50 minutes for every day since spring tides.

Q.—In proceeding up Channel, what consideration would you have when taking soundings?

A.—I would take into consideration the rise and fall, at spring tides, at the place near where I suppose myself to be, also the rise and fall on the day I was there, and the time from high water, and make a corresponding allowance on the soundings shown by the lead line.

Rise and fall of the tide:—

South Foreland	12	feet to	15	feet.	Start Point . . . .	11½	feet to	15	feet.
Dungeness . . . .	19	"	22	"	Plymouth . . . .	11	"	15	"
Beachy Head . . . .	15	"	22	"	Falmouth . . . .	12	"	16	"
Portsmouth . . . .	10	"	12½	"	Bristol Channel	33	"	44	"
Portland . . . .	4½	"	6¾	"					

Q.—You are making the English Channel, wind N.W., what land would you endeavour to sight?

A.—The Scilly Islands.

Q.—Suppose the wind to be W.?

A.—The Lizard.

Q.—Suppose you have been running for five or six days without any observation, wind blowing hard from the S.W., homeward bound, and by dead reckoning you deem yourself to be in the vicinity of the Scilly Isles; what would you do for the safety of the ship?

A.—Heave-to and get soundings, shape a course up channel, and not go any higher up than the Start, until I saw either a light or the land.

Q.—You get up as far as the Start, and it comes on very thick weather, what would you do?

A.—Heave-to on the port tack, taking a cast of the lead at least every hour until the water shoals, then wear round on the other tack for two or three hours; then wear towards the English coast, keeping the lead going, and so on till the weather clears up.

Q.—The weather clears up and you see the Start, what will you do?

A.—Run up as far as Dungeness and heave-to, head to southward, and wait for a pilot.

Q.—Suppose you have got the length of the Ness, and it continues blowing a gale from the S.W., what would you do?

A.—If it was ebb tide and daylight, and I could not get a pilot, I would proceed on to the Downs, taking care to see my anchors clear and chains ranged with 90 fathoms on deck on the working anchor, and 75 fathoms on the other, keeping my jack flying, and proceed through the Downs, passing to the westward of the Gull lightvessel; then steer N.E.  $\frac{1}{2}$  E. until near Margate, where I would haul right up for Margate Roads. Having arrived at the anchorage, and taken all sail in, I would put the helm a-lee, and when the vessel has lost her way, let go the anchor and pay out about 60 fathoms of chain, and point all the yards to the wind.

Q.—What mark is there to enable vessels to keep East of Margate Sand?

A.—A red ray of light from the North Foreland lighthouse, thrown between the bearings of S.  $\frac{3}{4}$  W. and S.S.E. (or from the Tongue light-vessel to one cable E. of East Margate buoy).

Q.—If blowing hard from the S.W., would you run so as to have your ship near Dungeness in the night?

A.—No.

Q.—Why not?

A.—Because I would have little chance of getting a pilot.

Q.—If you were as far as Dungeness early in the morning, still blowing hard, after a long spell of westerly winds, and the first of a flood with a heavy ship, what would you do, not being able to get a pilot?

A.—I would round the South Foreland and South Sand Head and shape my course round the Goodwin Sands, hauling round the North Sand Head and steer for Margate Roads. Or, if I thought I would run too great a risk in trying to get there, I would keep under easy sail till clearer weather, or till I got a pilot.

Q.—Suppose you had to slip in the Downs in an easterly gale, where would you run to?

A.—Back into Dungeness West Roads, and bring up a mile or a mile and a half to the westward of the lighthouse, and about a mile off shore.

Q.—How close would you go to the Ness?

A.—Not nearer than a quarter of a mile, where I would find 12 fathoms water.

Q.—How would you know the anchoring ground at night?

A.—The light shows red between the bearing of S.W. by W.  $\frac{1}{2}$  W. and the land, to mark the anchoring ground to the East; and a red light is shown from the lantern between the bearing of East and the land, to mark the anchoring ground to the West.

Q.—What water would you stand into and off from the principal headlands in the channel?

A.—	INTO.	OFF.	INTO.	OFF.
Scilly .....	65 fms.	69 fms.	Dunnoe.....	25 fms. 35 fms.
Lizard .....	45 "	53 "	Owers.....	23 " 30 "
Eddystone ....	42 "	51 "	Beachy Head..	18 " 28 "
Start .....	32 "	47 "	Dungeness....	12 " 20 "
Portland.....	30 "	36 "	South Foreland	10 " 18 "

Q.—What mark is there in the Gull Stream?

A.—A lightvessel, with one revolving bright light which attains its greatest brilliancy every 20 seconds.

Q.—Under what sail would you bring the ship into the Downs during a heavy S.W. gale, your square canvas being stowed?

A.—Fore-topmast and main-topmast staysail, and on arriving at convenient anchorage starboard the helm, and as she comes to the wind, set the mizzen, and down the fore staysail. When head to wind, and she has lost her way, let go the anchor and veer according to the indication of the weather, say to 75 fathoms.

Q.—Suppose you were riding in the Downs, and you part from your anchor, or are obliged to slip during a S.W. gale, what will you do?

A.—I would have my fore-topmast-staysail clear for running up, topsails double reefed and mizzen reefed, and I would keep a sea-watch during the gale. If obliged to slip, I would buoy my chain. If the cable parted, after getting the ship before the wind, find how much chain was hanging at the hawse-pipe, if but a little, haul it in, and if much I would slip it. I would steer to pass about three cables eastward of S. Brake buoy (a correct bearing of which should always be taken before dark); if South Foreland high light and Gull light are seen, bring the former S.W.  $\frac{1}{4}$  W., and the latter N.E.  $\frac{1}{4}$  E. After passing on either side of the lightvessel, keep her S.W.  $\frac{1}{4}$  W., and when North Foreland light is N.N.W., or North Sand Head lights E.S.E., haul out to eastward and lie-to in 18, 19, or 20 fathoms.

Q.—What is the best mark for large ships to anchor in the Downs?

A.—Upper Deal Mill in line with Deal Castle, W. by S., or a little open either way, and the upper South Foreland lighthouse, near the middle of Old Stairs Bay, 8 or 9 fathoms.

The lower light is not seen.

Q.—Proceed to work out of the Downs?

A.—I would cast towards shore, if convenient, to get the first of the ebb; stand towards Deal in 7 fathoms; tack before the Hope Land comes on with Cap Point, to avoid Deal Sand; stand towards the Goodwin to 12 fathoms, or till the South Sand Head lightvessel bears S.S.W.  $\frac{3}{4}$  W., but not more westerly; towards Walmer into 9 or 8 fathoms; and to the South Foreland 12 or 11 fathoms.

Q.—In leaving the Downs with a foul wind, state whether you would take the day tide or night tide, and why?

A.—It is better to take the night tide, as it will give me daylight to work the ship against the flood, and the following tide will take me round Dungeness, where I shall have plenty of sea-room.

# OFFICIAL LOG BOOK.

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*Index to Entries in Official Log Book.*

ENTRIES.	Reference to any pages in which the various entries appear.
1. Conviction of any Member of Crew and Punishment .....	
2. Offence committed by Member of Crew for which it is intended to prosecute or to enforce a Forfeiture or to exact a Fine, together with such statement concerning the reading over such entry, and concerning the reply (if any) made to the charge as hereinbefore required ..	
3. Offence for which punishment has been inflicted on board, and the punishment inflicted .....	
4. Illness or injury that has happened to any Member of Crew, the nature thereof, and the medical treatment adopted (if any).....	
5. Death that has happened on board and cause thereof .....	
6. Birth that has happened on board, sex of the infant, and the names of the parents .....	
&c.                  &c.                  &c.	

The above is a copy of part of page 5 of the Official Log Book. Explain how it is filled in.

On whatever page of the Log Book an entry is made, the number of that page must be placed opposite the subject matter of the entry above. For instance:—Pages 6, 7, and 8 of the Log Book are dedicated to a list of the crew and their character, &c.; hence, these numbers, 6, 7, and 8, must be placed opposite the seventeenth of the entries. On page 14 a death is recorded; hence, opposite the fifth entry the number 14 is placed; and so on for all other entries.

## List of Crew and Report of Character.

Christian and Surname at length of each Member of Crew.	Capacity in which engaged.	Report of Character*		If there is any entry in the Log relating in any way to the Crew, the page or pages in the Log where the entry is to be found should be written in this column opposite the man's name.
		For Ability.	For General Conduct.	

\* V.G "Very Good," G. "Good," or Dec., "Declines to Report." The Master may also insert particulars of ability or conduct; thus—"Helm" good, or "Sobriety" indifferent. If he declines giving an opinion, he must so state opposite the man's name.

The above is a copy of a part of pages 6, 7, and 8 of the Official Log Book. Explain how it is filled in.

In the first of the five columns, each space is for a man's name, the second for his rank, the third and fourth for his character, and the fifth, the number of every page of the Log in which his name occurs must be placed in this column opposite his name.

## Official Log of the.....from.....towards.....

Date of the Occurrence entered with Hour.	Place of the Occurrence, or situation by Latitude and Longitude at Sea.	Date of Entry.	Entries required by Act of Parliament.	Amount of Fine or Forfeiture inflicted.

The above is a copy of part of page 16 and following pages of the Official Log Book. A man has committed some offence for which you intend to have him punished upon your arrival in port, how would you make the entry in the above?

In the 1st column, the date and hour of the occurrence; 2nd column, the port, or lat. and long. if at sea; 3rd column, date of entry; 4th

column, the man's name and the charge, signed by the Master and the Mate, or some other member of the crew. Twenty-four hours before arriving at my port I should either give the man a copy, or else call him aft and read the charge to him and ask him if he had any answer to make to it; whatever answer he made I should enter it under the charge; and, lastiy, at the end I should write these words, "The above charge has been read to the man, and he has made the above (or no) reply," as the case may be. This note must be signed and counter-signed like the charge itself.

### *Ship's Draught of Water.*

The Merchant Shipping Act, 1894, Section 436 (3), enacts that the Master of every British sea-going ship shall, upon her leaving *any dock, wharf, port, or harbour (either at home or abroad) for the purpose of proceeding to sea*, record her draught of water and the extent of her clear side in the Official Log Book, and shall produce the record to any chief officer of Customs whenever required by him, and if he fails without reasonable cause to produce the record, shall for each offence be liable to a fine not exceeding twenty pounds.

The term "clear side" means the height from the water to the upper side of the plank of the deck from which the depth of hold as stated in the register is measured, and the measurement of the clear side is to be taken at the lowest part of the side.

*Dates of arrival at and departure from each port touched at, with the Free-board and Draught of Water upon every occasion of the Ship proceeding to sea.*

The above is a copy of a part of pages 11 and 12 of the Official Log Book.

**NOTE.**—Every entry in the Official Log Book required by the Act must be signed by the Master and by the Mate or some other of the Crew, and every entry of illness, injury, or death must also be signed by the Surgeon or Medical Practitioner on board (if any); and every entry of wages due to, or of the sale of the effects of, any Seaman or Apprentice who has died must be signed by the Master and by the Mate and some other member of the Crew; and every entry of wages due to any Seaman who enters His Majesty's Service must be signed by the Master and by the Seaman or by the Officer authorized to receive the Seamen into such Service.

Q.—What is an official log book ?

A.—A book supplied by the Board of Trade, in which the master of the ship is required by law to make certain entries, to be returned to the Shipping Office at the termination of the voyage.

Q.—State what are the principal entries which are required to be made in the official log book ?

A.—A list of the crew, offences, convictions, punishments, conduct, character, and qualifications of each of the crew, illness and injuries, medical treatment, births, deaths, and marriages, desertions, entering the navy, wages of deceased seamen, sale of deceased seamen's effects, collisions and the circumstances attending the same, order of a Naval Court, draught of water, and survey of provisions and water.

Q.—What is the first thing to be entered in the official log book ?

A.—The draught of water.

Q.—Suppose you had to make an entry against one of the crew for an offence, how would you do it ?

A.—Enter the date, the ship's position, and the charge made against him. Then read the charge to the man in the presence of the mate, sign it, and get the mate to sign it as a witness, and then call upon him for his defence ; if he make any, write it below he charge, sign it myself, and get the mate to sign it as a witness.

Q.—Suppose that circumstances arose which prevented you from reading the entry to the man, when must it be read to be legal ?

A.—If the offence was committed at sea it must be read before arrival in port, or before the ship sails if the offence occurred while in port.

Q.—When a seaman dies what entry is made in the official log book ?

A.—The day and the hour, the position of the ship, the man's name, the medical treatment the case has received, how long ill, and the cause of his death, balance of wages up to the day of his death, and list of his effects. Sign it and have it witnessed by the mate or other officer.

Q.—What would you do with the effects of a deceased seaman ?

A.—If possible, sell them ; if I could not, I would deliver them up to the shipping master on my return.

Q.—What is to be done with the balance of his wages and the proceeds (if any) obtained from the sale of his effects ?

A.—The money is to be handed over to the shipping master on the vessel arriving home.

Q.—What entry would you make if a man should leave you to join the Royal Navy ?

A.—The date, port, or position of ship if at sea, man's name, and that he left of his own accord to join H.M.S. "so-and-so," then an account of wages up to the day of leaving. The officer in charge of the boat that comes to receive him and his effects should be paid any balance due to the man, and the officer should sign this entry in the log ; or else the master and seaman must sign it.

Q.—What entry in the official log book does the Merchant Shipping Act, 1894, enforce?

A.—The master of every British sea-going ship shall, upon her leaving any dock, wharf, port, or harbour, for the purpose of proceeding to sea, record her draught of water in the official log book, and shall produce such record to any principal officer of Customs whenever required by him so to do, or in default of such production shall incur a penalty not exceeding twenty pounds.

Q.—Where is the ship to be marked so as to show her draught?

A.—On her stem and on her stern-post in Roman capitals six inches in length.

Q.—What part of the figures would you take?

A.—The lower part.

Q.—The Merchant Shipping Act of 1894 requires another entry to be made, what is it?

A.—The amount of clear side.

Q.—Where are you to measure the clear side?

A.—At the lowest point.

Q.—How are you to measure it?

A.—Measure it from the top of the rail to the water outside, and from the top of the rail to the deck inboard; the difference is the amount of clear side.

Q.—On your arrival home what is to be done with the official log book?

A.—It must be handed over to the shipping master within forty-eight hours after arrival, or when discharging the crew, whichever happens first.

## SHIP'S BUSINESS.

Q.—You are appointed master of a ship, what is the first thing you would do on taking command?

A.—If in an English port, take the ship's register to the Custom House and get my name put on it; but if in a foreign port, get my name put on the ship's register, and get all the ship's papers from the late master, and enter a list of them in the Official Log Book, and sign it myself and get the late master to sign it.

**Certificate of Registry.**—The certificate that the ship has been properly registered by law. It contains the name of the ship, the port she belongs to, the details as to tonnage, build and description, and the registered owner's name; and it is the proof of the Master's right to be in command, the date of his appointment and number of his certificate being endorsed on the back by the Registrar.

## CHARTER PARTY.

Q.—What is a **charter party**?

A.—A written contract for the letting to freight the whole or part of a vessel for one or more voyages.

Q.—State the **parties by whom a charter may be legally executed**?

A.—The merchant and owner at home, and the master and agent, generally, when abroad.

Q.—What does the owner **agree to do in a charter party**?

A.—He agrees to find a ship, good, sound, staunch, and strong, and every way equipped for the voyage.

Q.—Should a charter party be made out in the master's name?

A.—It is not correct to do so, except at a foreign port, or when he is part owner of the ship.

Q.—Describe the **principal clauses in a charter party**?

A.—The nature of the intended voyage or employment, the freight and how paid, the lay days and demurrage, if any, the penalty for non-performance of agreement, and the clauses\* adapted to the circumstances of the voyage and the parties concerned.

NOTE.—The form of charter party is usually part printed and part written and states the name and tonnage of the ship, the nature of the voyage or employment, the description of cargo to be carried, and the maximum draught to which she has to be loaded, the number and nature of the lay and demurrage days, the amount of demurrage to be paid, and a lien for the cargo should be obtained if possible. The amount of freight must be stated and how and when it is to be paid, with a penalty, usually of the same amount, in case either party fails to fulfil his part of the agreement.

Q.—In the charter party you promise that the goods shall be delivered at the port of discharge in the same good order and condition in which they are received on board; what is the exceptional clause put in?

A.—“The Act of God, the King's Enemies, Restraints of Princes and Rulers, Pirates, Fire, and all and every other Dangers or Accidents of the Seas, Rivers, and Navigation, of what nature and kind soever, during the said voyage, being always excepted.”

Q.—What additional clauses would you have for a steamer?

A.—“Accidents to boilers and machinery excepted. Liberty to call for coals. Liberty to tow or to be towed.”

Q.—State what makes a charter party a legal document?

A.—Being stamped, sealed, and signed by the contracting parties before a witness or witnesses, who must attest these signatures.

\* Cargo brought to and taken from alongside at merchant's risk and expense. In foreign ports, charters are not usually stamped and yet hold good in an English court.

Q.—What is the **clause that makes the charter party binding?**

A.—The penalty for non-performance.

Q.—What is the penalty?

A.—The amount of freight generally; sometimes a stated sum.

Q.—State when only one witness to the signatures is required, and when more than one is required?

A.—When the freighter or his agent and the owner or the master both sign at the same time, one witness only is required; but when the contracting parties sign at two separate and distinct times, a witness to each signature is required.

Q.—What is meant by **lay days?**

A.—The days specified in the charter for loading and discharging.

Q.—When do the lay days run from?

A.—From the time of the ship's arrival at the *usual place of discharge* in the port, having given written notice to the merchant of my arrival, and entered my ship at the Custom House.

Q.—What should the charter party specify with respect to lay days?

A.—Whether they are "running days" or "working days," according to the intention. In London "days" mean "working days," and Sundays and holidays do not count until the ship is on demurrage. After that all days count.

Q.—Would you allow "working days" to be inserted in the charter?

A.—No; I would insert "running days," even if I had to allow more of them.

Q.—Would you allow the phrase "Sundays and holidays excepted"?

A.—I would not.

Q.—What is demurrage?

A.—It is a stipulated sum to be paid by the charterer for delaying the ship after the lay days specified in the charter have expired.

Q.—Your lay days have expired, but the cargo is not all on board, what would you do?

A.—Give a written notice to the merchant informing him of the fact, and advising him that I shall come upon demurrage the next day; then enter a copy of the notice in the ship's log.

Q.—How is demurrage claimed?

A.—Day by day, in writing, and Saturday for Sunday.

NOTE.—The shipowner has no lien for demurrage unless it is agreed for in the bill of lading.

Q.—What precaution would you take with respect to charters and bills of lading?

A.—I would take care to have stamped charters and bills of lading.

Q.—Does a charter party entered into abroad, where no stamp is required, require one when it reaches England?

A.—Yes; an adhesive sixpenny stamp may be put on within ten days of its reaching the United Kingdom, and must be cancelled by the party writing his name thereon, with the date of his so signing.

Q.—When about to charter your vessel for a port where you have not been before, what particulars would you ascertain respecting the port?

A.—I would ascertain if it was a safe port to go to; if the general expenses were moderate; and if there was any likelihood of getting a cargo at the port.

Q.—What are the general expenses?

A.—Pilotage, towage, harbour and hospital dues, provisions, and water.

Q.—Enumerate the particulars you would ascertain before chartering your ship.

A.—Ascertain if the season and winds be favourable, if there be water for the ship, if the port be accessible, what the customs and expenses of the place are, whether the goods should be shipped by weight or measurement, and what articles would be objectionable; also, at whose expense the cargo would be loaded and discharged, that is, in bringing it alongside and taking it to the consignees. I would have specified the quantity of dead weight and light freight to be taken on board,\* that the lay days should be running days. If the cargo boats are to come over a bar I would have a clause inserted in the charter party stating that the days the boats are delayed in consequence of bad weather or too much surf should be counted as lay days.

Q.—What clause in the charter party protects you from having deck cargo?

A.—“That the ship shall not carry more than can reasonably be stowed away.”

Q.—What is the **afloat clause**?

A.—Ship to load where she will lie afloat at all times of tide.

Q.—What is meant by the **ice clause**?

A.—In case of ice beginning to form before the ship is load, vessel to be at liberty to proceed with what cargo she may have in.

Q.—You are bound to a port that is frozen in the winter, and it is probable that ice will have formed in the inner harbour before you arrive there, or before you have time to discharge there, what clause will you have inserted?

A.—At a certain date, or before that date, if there be ice in the inner harbour, ship to discharge in the outer harbour before entering the inner harbour.

\* *Light Freight*—Goods taken by measurement; it varies in different ports, but should not exceed 50 cubic feet to the ton. In England 40 cubic feet make a ton measurement.

\* *Dead Weight*—Goods taken by weight, or goods that weigh more than a ton measurement of 40 cubic feet, as iron, copper, lead, &c.

Q.—What is the meaning of the phrase “Without prejudice to this charter”?

A.—It means that if the shipper presents bills of lading for signature at a less rate than the charter, the consignee is not liable for the difference, but the charterer is liable.

Q.—What is done with the charter?

A.—The original charter must be stamped, and it is left in the hands of the broker, who gives the master a certified copy of it which should be also stamped.

Q.—What is done with the charter in some foreign countries?

A.—It is necessary to employ a sworn broker, who fixes his seal to the charter, otherwise it is not a legal document, and cannot be used in a court of law.

Q.—Who cancels the stamp?

A.—The person who signs last.

Q.—Who signs last?

A.—The last contracting party.

Q.—How do you cancel the stamp?

A.—By writing my name across it and dating it.

Q.—What is the penalty for not cancelling the stamp?

A.—Fifty pounds.

Q.—When is the charter party considered to be complete?

A.—When it is dated, signed, and the stamp cancelled.

## BILLS OF LADING.

Q.—What is a **bill of lading**?

A.—A document whereby the master acknowledges the receipt of goods shipped on board.

Q.—What does the master engage to do in a bill of lading?

A.—He agrees to carry the goods to the port of destination, and binds himself, under certain exceptions, to deliver the goods in like good order and condition as he received them on board, to the party to whom they were assigned, upon payment of the stipulated freight.

The particulars of the freight should be filled in the margin, and freight as per margin inserted in the body.

Masters should always see that the bills of lading are worded Freight, Demurrage, and all other conditions as per charter party.

Q.—State the **exceptional clauses** in a bill of lading?

A.—The act of God, dangers and accidents at sea, fire, King's enemies, &c., the same as in a charter party.

Q.—What **extra clauses** would you have in **for a steamer**?

A.—“With liberty to call for coal at any intermediate port or ports, to sail with or without pilots, and to tow and assist vessels in all situations of distress.”

Q.—Should bills of lading be **stamped**?

A.—Yes.

Q.—How **many bills of lading are usually signed** by the master?

A.—In general, for foreign-going ships, three bills of lading of the same tenour and contents are made out and signed by the master, in addition to an unstamped copy for his own use.

NOTE.—In England three bills of lading are required, each having a sixpenny stamp before being signed, under a penalty of £50.

Q.—How do you know when you have signed a complete set of bills of lading?

A.—By the number being specified in the bills of lading. If three formed a set, they would run thus:—The master has signed three bills of lading, &c., and so on.

Q.—State **what is done** with these bills of lading?

A.—One is sent to the consignee by the shipper of the goods; another is retained by the shipper; and the third is retained by the master, and accompanies the goods as his guide in delivering them.

NOTE.—At Cronstadt and some other places the master must have two bills of lading.

Q.—When **ought bills of lading to be signed**, and what precaution should be taken with respect to the mate's receipts before signing them?

A.—Within twenty-four hours of the goods being actually shipped; the mate's receipts being produced and the master having satisfied himself as to the quantity shipped, and the condition in which they have been so shipped.

In loading a general cargo, two cargo books are kept, and after each day one is delivered to the broker, and the captain signs for what the mate has put in the cargo book the preceding day, while the other cargo book is being filled up.

It is too common a practice for any clerk in the office of the shipping agent to subscribe the bills of lading for the master; but you should be particular, where at all practicable, to sign the bills of lading yourself, and in taking care that the goods entered in them correspond with the goods entered in your manifest or cargo book. It need scarcely be said that the bills of lading must not be signed until the goods are actually on board, and they must not contain anything that is contrary to or inconsistent with the truth.

Q.—Who is the **last person** to sign the bill of lading, and how does he sign it?

A.—The Master is the last person to sign the bill of lading, and he signs across the stamp, with the date.

Q.—There being so many bills of lading is there not a risk of having two or more presented to you at your port of discharge?

A.—No; there is always a clause in the bill to this effect:—"In WITNESS whereof, the master or purser of the said ship hath signed . . . . Bills of Lading, all of the same tenour and date, one of which being accomplished the others to be void."

Q.—How must you satisfy yourself that the person named by your broker is the consignee?

A.—He must produce the stamped bill of lading signed by me, and which has also been endorsed by the shipper.

Q.—What difference is there between the bill of lading as it left your hand on signing it and when you see it again in the consignee's hand?

A.—It will now bear the endorsement of the original shipper.

On arrival at port of discharge the goods must, on payment of freight (unless there is notice for stoppage), be delivered to the person who presents the bill of lading endorsed by the shipper.

Q.—Suppose the bills of lading be specially endorsed, thus:—"To be delivered to B on order from A"; or, "To be delivered to B on payment for the goods"; or in any other manner?

A.—B in the first case produces A's order before I deliver the goods to him; in the second case he must produce proof that he has paid for the goods; or, whatever may be the special endorsement, he must produce proof that it has been complied with before I deliver the cargo to him, otherwise my owner would be liable to the shipper for wrong delivery.

Q.—If, on arriving at your port of destination, two parties each present a bill of lading, what would you do?

A.—I would accept the one which was stamped, signed by myself, and endorsed by the shipper.

Q.—But suppose they are **both alike, being stamped, signed, and endorsed**, how would you act under the circumstances?

A.—To the first that came, provided he would give me a deed of indemnity against any other claim.

If the shipper has endorsed the bills of lading to different persons you will be justified in delivering to the person who first presents the bills of lading in his own name, or with a proper endorsement. Should two or more parties claim right to the goods, they should be delivered to the one who can give you the best security, upon which you can rely, to indemnify you against the consequences of your so delivering them. And should none of these methods be practicable, or should the goods be stopped *in transitu* by the shipper, or should no holder of a bill of lading appear during the lay days—after having thus waited a reasonable time you ought then to deposit the goods in a public warehouse in *your own name as master*, in security of the freight and charges.

Q.—Suppose that on your getting to your destination with a cargo you cannot find your merchant, what would you do?

A.—Advertise for him, and place notices in all the public places.

Q.—How long would you advertise for him?

A.—During my lay days.

Q.—Your lay days are up and the merchant has not come forward to claim your cargo, what would you do?

A.—After having thus waited a reasonable time, discharge it into a public warehouse *in my own name as master* in security of the freight and charges, and in this way free myself and owners from all responsibility as to the goods, and from all questions as to the party best entitled to them.

Q.—Suppose you sign a bill of lading to order, to whom would you deliver the cargo on your arrival?

A.—To the holder of the bill of lading, after seeing that it is properly endorsed by the shipper.

He should also undertake for payment of freight according to bills of lading, particularly if you have any doubt of your charterer's solvency.

Q.—When ought a bill of lading to be endorsed?

A.—When it is transferred.

Q.—If the goods in a bill of lading were consigned to order, what would you enter in the consignee's column of the manifest?

A.—To order.

Q.—When the **quantity, quality, or condition** of the goods, &c., **are unknown**, would you qualify your obligations in the bills of lading? if so, how would you do it?

A.—Yes; by writing above my signature "quantity and quality unknown," or "contents unknown," or "not liable for deterioration," "not liable for leakage."

In London it is customary for the brokers to stamp the bills of lading "weight and contents unknown," "not accountable for leakage," "breakage," "rust or destruction by vermin," and the master when signing the bills of lading puts his initials to the stamp made by the broker.

The words "not liable for leakage" prevents any claim on the ship for any deficiency of cargo, but in order to secure the full amount of freight the words "*payable for quantity shipped*" must be introduced.

Q.—How would you sign a bill of lading for 500 cases of tea?

A.—Weight unknown.

Q.—You are going to receive 400 tons of molasses in casks, what clause would you insert in the bill of lading?

A.—"Contents unknown; not accountable for leakage, and freight to be paid according to quantity shipped, as per gauge of cask."

Q.—How would you sign for crates of earthenware or glass?

A.—Contents unknown; not accountable for *breakage*.

Q.—If live stock is shipped?

A.—Not accountable for *accidents or mortality*.

Q.—What extra precautions would you observe if the goods were to be delivered in an open bay?

A.—Besides the above remarks, write:—"To be taken from ship's tackles at the risk and expense of the consignee," unless I was paid extra freight for taking the risk myself.

Q.—Suppose you take goods at a reduced freight, but with the understanding that they are to be used as dunnage, what would you write opposite?

A.—Shipped as dunnage.

Q.—Coming home to England with foreign bills of lading, what would you do?

A.—Get them stamped.

Q.—Within what time can they be stamped ?

A.—Within seven days (with a sixpenny stamp) after arrival.

Q.—In all cases of dispute, detention, or difficulty, what would you do ?

A.—Write home to my owners giving a full account of the same, with copies of documents.

Q.—Suppose you had a full cargo of grain, and had lain all your lay days and some of your demurrage days, the merchant wants you to sign clean bills of lading, would you do so ?

A.—No ; not unless the merchant pays the demurrage, or gives a guarantee for its payment.

Q.—The merchant will not make any agreement in reference to the demurrage, what will you do ?

A.—Protest against him ; then present bills of lading of my own, stating the number of lay and demurrage days spent in loading.

Q.—Suppose the consignee refuses to pay the freight, how would you act ?

A.—Apply for judicial authority to enable me to sell as much of the cargo as will pay the freight and all the charges.

Q.—What is a sealed bill of lading ?

A.—One that is sealed with the same seal as the articles to which it alludes. It is generally used when bullion in boxes is placed on board.

Q.—The mate's receipts show less cargo than the bills of lading do ?

A.—Insert a clause "So much cargo in dispute, if on board to be delivered."

Q.—The merchant will not allow you to insert this clause ?

A.—Sign under protest.

Q.—The merchant will not allow you to sign under protest ?

A.—Fill up bills of lading of my own, sign them before the Consul, and get him to write the merchant an official letter enclosing the bills of lading, and get an attested copy of the letter to send to my owner, then proceed to sea.

Q.—If your merchant wish you to sign bills of lading before your cargo is on board, what would you do ?

A.—Refuse to do so ; for he might fail, or the goods might take fire or be lost, so that they might never be shipped. Sign for the portion of cargo actually on board.

Q.—Bills of lading in a foreign language, which you do not understand, are presented to you for signature, what would you do ?

A.—Get them translated, or write "All conditions as per charter ; everything contrary thereto to be null and void."

Q.—Your merchant from some cause wishes his goods to be unshipped at the port of loading after they have been shipped, what must he do ?

A.—Pay the full freight the ship would have earned had she proceeded to her discharging port with the goods ; he must also return the bills of lading to the master ; or, failing to do so, he must give the

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master a deed of indemnity against all claims for the goods from the holders of the bill of lading.

Q.—What is dead freight ?

A.—Dead freight is the indemnification which the master or owner claims from the freighter who has engaged to furnish the ship with a full cargo and fails to do so.

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## INVOICE.

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Q.—When goods come on board what document comes with them ?

A.—An invoice, which is often called a boat note.

Q.—How many invoices usually come off, and what becomes of them ?

A.—Two ; the master signs one and gives it back, and files the other.

Q.—What is meant by an **invoice** for shipping purposes ?

A.—An account of goods sold or consigned.

Q.—What **particulars** does it contain ?

A.—A description of goods with marks and numbers ; the prime cost, and all charges ; also, the name of the ship, of the master, export merchant, and of the consignee.

Q.—What are the **charges** ?

A.—Freight, insurance, entry bond duty, dock charges, lighterage, commission, stamps, &c.

Q.—What is the **use of the invoice** ?

A.—It enables the consignee to put a proper value on the cargo.

Copies are usually sent to the ship so that there may be no delay in entering the cargo at the Custom House, where they are required for assessing duties.

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## MANIFEST.

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Q.—What is a manifest ?

A.—A document used for entering the ship at the Custom House. It is made out principally from the bills of lading, and contains ship's name, port of registry, registered tonnage, the master's name, particulars as to the cargo on board, such as the marks, numbers, and quantity of the different articles as cargo, the names of the shippers and consignees, port of loading and discharge, list of stores, crew and passengers, &c. ; in fact, *full particulars* relating to the ship, the cargo, the crew, and the passengers (if any).

The manifest is usually signed by the shipbroker who clears the vessel at the Custom House, and by the master.

Q.—Where do you obtain the items for making up the manifest ?

A.—From the bills of lading.

Q.—What is done with the manifest ?

A.—It must be handed over to the Custom House on the arrival of the ship at the port of destination.

## LLOYD'S AGENTS.

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Q.—If a vessel puts into a port in distress, is the master bound to employ Lloyd's Agent?

A.—No; the master himself is agent for all concerned.

Q.—Under what circumstances can the authority of the master be dispensed with?

A.—When he neglects his duty or abandons his charge, and his conduct is such as to cause the existing authorities to deprive him of the command (which can only be done with the consent of the consignee of the cargo), the authority of the master can be dispensed with.

NOTE.—There is a prevalent idea among the generality of shipmasters that when they meet with any loss or damage their first duty is to place themselves under the advice and control of Lloyd's agent. No idea can be more fallacious; but there can be no doubt that the advice of Lloyd's agent under such circumstances is most valuable, as possessing more local knowledge and of the facilities of the place where the loss or damage may happen.

The master must always bear in mind that in all cases of wreck, loss, or damage, he alone is the agent of the owners, and of the underwriters, and of all and every one interested in the ship and cargo. He cannot relieve himself from this responsibility excepting by acts of his principals, and he is bound to act as he thinks best for the interests of all concerned in the salving and disposing of the property salved; and the owners and the underwriters are bound by his acts, if done in good faith.

Should the owner elect to abandon and the underwriters allow the master to continue in the management of the wreck, he then becomes their agent, and they are bound by and accountable for his acts, and he is accountable to them for value of the goods and property salved.

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## PROTESTS, SURVEYS, &c.

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Q.—In case the merchant's correspondent at port of loading should **refuse or not be able to furnish a cargo**, what would you do under such circumstances?

A.—Lay out my lay days, having previously given written notice of being ready to load.

If arrived at a port of loading and cannot find the merchant or consignee, be sure to advertise and keep copies of the papers, and put notices up at the Exchange and Custom House, or any other public place.

Q.—Is it proper to **wait** the demurrage days under such circumstances?

A.—Not unless requested to do so.

Q.—What do you next do?

A.—Protest against the merchant for non-fulfilment of charter party, and send the protest home to enable the owner to recover damages.

Q.—What would you then do with the ship?

A.—I am then at liberty to return in ballast to my chartered port of discharge, and have a right to my full freight; but it is better to seek a freight in another direction, and claim the deficiency of freight from the merchant.

Q.—If on the **expiry of the lay days the cargo be not fully unladen**, how would you act?

A.—Protest against the merchant or shipper, so that the ship may thereafter lay on demurrage. Similar protests ought to be taken at the expiry of the demurrage days.

Q.—What is the use of the protest?

A.—It is used for the purpose of recovering the amount of loss or damage from those persons who may be liable.

Q.—Suppose you put into port with decks swept and bulwarks gone, &c., what would you do?

A.—Report myself to the port authorities and to the Consul, and note a protest.

Q.—If on arrival at port you **suspect your ship or cargo to be damaged**, in consequence of bad weather experienced during the passage, what is the first thing you would do?

A.—Note a protest "against wind and weather," as the term is.

Q.—What is meant by noting a protest?

A.—Going to a notary; or, if in a foreign port, to the British Consul, and giving the particulars of the voyage, the storms and gales encountered, as entered in the log book, protesting that any damage that may have happened was caused by winds, bad weather, &c., stating that you anticipate damage to the ship or cargo, or both, and he makes a note to that effect.

Q.—**Within** what time must you **note a protest**?

A.—Within twenty-four hours of arrival in port.

Q.—What is the next thing you do when you have perishable cargo on board, or anticipate damage to have occurred either to ship or cargo?

A.—Call a survey on it.

Q.—While opening the hatches, before bulk is broken, what precaution should be taken?

A.—It may be necessary to hold a survey in order to ascertain whether the hatches have been properly battened down and secured.

Q.—**Whom** would you call as **surveyors**?

A.—In surveying a ship, two shipmasters, or, in their absence, any two qualified persons; in surveying a cargo, merchants acquainted with the nature of, but not interested in, the cargo should be called as surveyors.\*

\* In the principal ports of Australia there are licensed surveyors who must be employed.

Q.—Suppose damage to have occurred to the ship, what do you first ask of the surveyors?

A.—A written report or certificate as to the particulars of the damage.

Q.—What would you do with the certificate they gave you?

A.—Send a duplicate to the owners.

Q.—Before surveying the cargo is anything to be done, if so, what?

A.—Yes; a survey should be previously made upon stowage and dunnage of the cargo on board.

Q.—What should the surveyors of a cargo be able to certify, in order to save a claim being made on the ship for damage?

A.—That the ship is properly dunnaged and stowed, and that the hatches are well battened.

If the damage be of any extent it will be your first duty to have a survey of the ship and cargo made by competent and fitly qualified persons. For that purpose it may be necessary to unload and warehouse the cargo, and the expenses of so doing are matter of general average. You ought to forward copies of the surveys and protest to your owners and the shippers, and if you can hear from them in a reasonable time you ought to wait their instructions. Perhaps the surveyors may report that the cargo, or at least part of it, should be sold: but this recommendation you will adopt or not just as you, acting as an honest man, consider it proper or necessary and the best that can be done under the circumstances for the benefit of all concerned.

Q.—Upon whom does the expense of this survey fall?

A.—This survey being done for the protection of the shipowner, the expenses fall upon him.

Q.—What should the survey report of a cargo particularize?

A.—The survey report of a cargo must particularize the goods damaged, mentioning their marks, numbers, &c. Specify the nature of the damage, and the cash market price of the goods were they in a sound state; the master of the vessel also ought to be called to attend the survey upon them, and to certify in writing the nature and cause of the damage.

Q.—What must the surveyors be able to certify, so as to enable the shipper to make a claim upon the underwriters?

A.—They must certify the goods to be damaged by sea water.

Q.—When the repairs of the ship have been completed, what do you do?

A.—Call the surveyors to inspect the vessel, and give a written report or certificate as to the repairs which have been executed.

Q.—What further steps will you take to protect the ship?

A.—Extend the protest.

Q.—What is meant by extending the protest?

A.—Going to the same notary with your log-book, and other documents relating to the damage, &c., and he draws up or extends in legal form these particulars.

Q.—After the cargo is discharged they condemn your ship, what will you do?

A.—Charter another vessel and forward the goods on, or it would be better to communicate with my owners and merchants for instructions.

Q.—In this case would the full freight be due to the owners whatever freight you might pay to the other ship?

A.—Yes.

Q.—You cannot get another ship, what would you do?

A.—If a perishable cargo, sell it; if not, warehouse it. Telegraph or write home to my owner informing him what I had done.

Q.—Suppose you are up the Black Sea and chartered home for a full and complete cargo of grain; you commence to load, and receive a quantity of grain; the merchant informs you that he is unable to furnish a full and complete cargo, what will you do?

A.—Call a survey and have the space measured off. If the merchant agrees to pay freight for the difference of cargo I would sign clean bills of lading; if not I would protest.

Q.—In extending a protest what must you be very careful about?

A.—To see that nothing was put into it that cannot be proved by the ship's log.

Q.—If you were in a steamer and had gone in with machinery damaged, whom would you call on the survey?

A.—A shipmaster and an engineer.

Q.—Suppose you had **no money to pay for the repairs** of your ship, what would you do to procure it?

A.—Telegraph or write to my owners, if I could do so.

Q.—Suppose you are too far off to do so in a reasonable time, what would you try next?

A.—To raise the money by bill upon my owners.

Q.—You cannot succeed in raising money in that way?

A.—I would try to get it on a bottomry bond.

**In Foreign Port in Distress.**—On arrival note a protest, and, if possible, advise with the owner by telegraph, and if the damage is serious wait his instructions (in any case he should be communicated with as soon as possible), otherwise appoint a respectable agent to transact the necessary business; call a survey on the damage and advertise for estimates for repairs, accepting the best but not necessarily the lowest tender. If possible the surveyors should be appointed and the estimates opened by the Consul. When the repairs are completed again call a survey, and extend the protest.

If the requisite money cannot be obtained on the owner's credit, it may be raised by bottomry, respondentia (see pages 178 and 179), or, as a last resource, by selling part of the cargo by auction or private sale, whichever is likely to make the best return.

Before leaving the port full particulars should be sent to the owner, together with the protest, certificate of survey, estimates, and received accounts, verified by the Consul. Three sets of these documents must be obtained, two sets being sent to the owner by different mails, and the other retained by the master.

## BOTTO M R Y, &c.

Q.—What is a bottomry bond?

A.—A contract whereby a ship is pledged in security of money advanced for the purposes of her voyage.

Q.—Under what circumstances is a master authorised to borrow on bottomry?

A.—When he cannot procure money on his own credit, or by drafts on his owner, and has no other means of obtaining money on the credit of the property.

Q.—When does the owner become liable for the amount borrowed on bottomry?

A.—On the safe arrival of the ship at her destination.

It is always a stipulation in a bottomry bond that the sum lent, with the premium or maritime interest, is to be paid in a certain number of days after the vessel arrives at her moorings in the port of discharge mentioned.

A bottomry bond is often given as a collateral security in case of the draft on the owners being dishonoured, on the understanding that if the draft be duly accepted no bottomry premium is to be enforced, but only the cost of insuring the disbursements for which the bond was given.

Q.—Supposing the ship to be lost before the completion of the voyage, would the lender get his money back?

A.—The lender loses the whole of his money, including interest; but if she reach her destined port in safety, the ship as well as the person of the borrower is liable for the money lent and interest thereon.

Q.—What clauses do a bottomry bond contain?

A.—Bonds of bottomry have no settled or precise form; but it is necessary that there be expressed the occasion which induced the necessity of borrowing on bottomry, the sum so borrowed, the premium or marine interest to be paid, the ship and voyage, the risk to be run by the lender, and the security of the ship itself for payment.

Q.—Is anything payable before a bottomry bond?

A.—Seamen's wages.

Q.—What is the authorised mode of procuring money on bottomry?

A.—The money to be borrowed is advertised for, and that offered at the lowest rate of interest is accepted.

Q.—In what order are bottomry bonds payable, supposing more than one have been contracted?

A.—The latest in date is entitled to be first satisfied, and backwards according to date.

Q.—You have put into a foreign port, and the value of the ship and freight is deemed insufficient for the sum required, what would you do?

A.—I have the power, when all other means of raising money have been resorted to, either to sell *part* of the cargo, or to pledge or hypothecate the ship, cargo, and freight *in security* of the sum lent.

The meaning of hypothecation is, "that it imports a pledge without immediate change of possession, in which the possession of the thing pledged does not pass to the creditor; it gives a right to the party who makes advances upon the faith of it to have possession if his advances are not repaid at the stipulated time; but it leaves to the proprietor of the things that may be hypothecated the power of making such repayment, and thereby freeing them from the obligation."

**N**O.T.—A lender on bottomry or respondentia is not entitled to the benefit of salvage, neither is he liable to contribute in case of general average.

**Q.**—What is respondentia?

**A.**—Money lent on security of the cargo.

**Q.**—What is the difference between a mortgage and a bottomry bond?

**A.**—The former is entered into by the owner, and the money raised may be spent in any way he pleases; the latter is entered into by the master, and the money raised must be spent only upon the repairs of the ship necessary to enable her to complete the voyage.

**Q.**—If a ship has been mortgaged and a bottomry bond has been obtained, which is paid first?

**A.**—The bottomry bond.

**Q.**—Is the master justified under some circumstances in selling part of the cargo for the purpose of repairing the ship?

**A.**—Yes; under some circumstances the master may be justified in selling part of the cargo for the purpose of repairing the ship and bringing home the rest of the cargo; the loss by such sale would be the subject of general average.

## AVERAGE—GENERAL AND PARTICULAR.

**Q.**—What is meant by general average?

**A.**—General average is a term used to express loss caused by the voluntary sacrifice of part of the ship or cargo for the preservation of the whole.

**N**O.T.—When part of the ship or cargo is *voluntarily sacrificed*, or some extraordinary *expense* is incurred for the common benefit, by such sacrifice the remainder of the property is said to be subject to *general average*. Thus, whatever a master of a ship in distress does for her preservation—in cutting away her masts, slipping from her anchors, or in throwing goods overboard to lighten her—is called general average, and all who are interested in the ship, freight, and cargo have to bear an equal proportion of the loss of what was sacrificed for the common welfare. If a vessel sprung a leak on the voyage, and enters a port for repairs, the charges for unloading and loading, expenses of warehousing, &c., are general average. In fact, all losses sustained and all expenses incurred voluntarily, with a view to prevent a total loss, are to be made good by the ship, freight, and cargo, in proportion to their respective values—in other words, by a general contribution or average.

**Q.**—A ship at anchor sees that she must be run into by another ship unless she slips, and, thus, by slipping, loses anchor and chain; what kind of average does this come under?

**A.**—General average; because it was a voluntary sacrifice necessary to save the whole ship and cargo.

Q.—Give some other instances of general average?

A.—A ship is caught in a squall and thrown on her beam-ends, and the masts are cut away by the master's orders; a ship is likely to founder, and, therefore, part of the cargo is thrown overboard; a vessel is riding, say in Odessa Mole Head, alongside of other ships, the spare towlines and warps are put over for fenders and are destroyed; the master is forced to sell part of the cargo for the purpose of repairing the ship and taking the remainder to its destination. The loss caused by any of these things would be a subject of general average. The expenses attending on getting a stranded ship afloat again is also a general average contribution.

Q.—Who or what pays for the loss by general average?

A.—The cargo, the ship at the end of the voyage, and the freight, less wages and expenses, each pay in proportion to their value.

Q.—Do the victuals and wages contribute?

A.—No, they do not contribute.

In general average, contribution is made by every kind of merchandise on board for traffic, the ship on its net market value at the port of destination or place where the voyage is broken up; the freight, less wages and expenses; the victuals and wages do not contribute.

Q.—What is a **particular average**?

A.—A term used to signify damage or partial loss unavoidably happening to one of the individual interests through some peril insured against.

The most common instances in which particular averages occur are:—

1. Where a mast, cable, or other part of a vessel is carried away by a storm, and not *parted with*, *cut away*, or *abandoned*, in order to save the vessel—this loss must fall upon the ship and freight, and if insured, is to be indemnified by a particular average.

2. When the masts, sails, and bowsprit have been damaged in a storm, or sudden squalls, and in order to repair these damages, the master puts into a port, the expense of these repairs forms a subject of particular average.

3. Though, in an ordinary case, damage sustained in avoiding a lee shore falls under the ordinary tear and wear of the voyage, which the vessel ought to be strong enough to undergo, yet, where the damage arises from extraordinary circumstances, as by standing out to sea with a press of sail in tempestuous weather, in order to avoid being driven ashore and stranded, or by carrying a press of sail in order to avoid or escape from an enemy, this damage can be claimed as particular average from the underwriters.

4. Where the vessel has stranded, or struck the ground, or strikes upon a rock, this is also particular average, unless where there has been a voluntary stranding for the general safety of the ship or cargo.

5. Where in scudding before the wind, in lying-to, or in a heavy cross sea, the pitching or rolling of the vessel carries away her masts, or damages her stanchions or upper works, or heavy seas burst the sails, or wash overboard the boats, properly fastened to ring-bolts on deck, or wash over articles then necessarily on deck—these are all matters of particular average.

6. Where, in a storm, or from some other violent cause, the vessel springs a leak from which damage ensues, this falls under particular average, unless the leak arises from the ordinary working and straining of the vessel, or is owing to her age or insufficiency, or some other hidden defect.

7. Where damage is done to the vessel, either by her running foul of another vessel, or being run foul of by another, without blame being attached to either side, the damage thereby sustained is also defrayed by a particular average; and, where the collision has been occasioned by the negligence or misconduct of the other vessel, the underwriters on the vessel injured are liable for the loss, as particular average, only; they can recover the damage from the owners of the vessel causing the damage.

When the ship is insured it is usual to insert the clause—"free from average under three per cent., unless general or the ship be stranded,"—this means that the partial loss (not being a general average and the ship not having been stranded) must amount to three per cent. on the amount insured before any claim can be made on the underwriters.

It is also customary (unless the ship is new and on her first voyage) when settling an average claim on the part of the ship, to deduct one-third from the amount of the loss in consideration of old materials being replaced by new.

Q.—You have **incurred losses** during the **voyage** which are **proper subjects for a general average**, what would you do on your arrival at your port of destination?

A.—Make a regular protest, inserting the whole particulars of the jettison as entered in the log book, and along with two or more of the crew I would make oath that the goods were then thrown overboard, or the loss incurred for the safety of the ship and the remainder of the cargo, and for the preservation of the lives on board, and for no other reason.

Q.—What is an **average bond**?

A.—An agreement signed by the consignees or owners of a cargo, binding themselves to pay any proportion of average that may justly arise against them in consequence of some accident which the ship has met.

NOTE.—It is particularly advisable for the master to obtain this security before he parts with the goods *to a consignee*; the real owner of them is liable without signing such a bond, but a consignee is not; and, therefore, by the latter refusing to pay, the shipowner might be left to seek recovery from the principal residing abroad or at a distance. A special lien, or equivalent, *in rem*, is given to the shipowner on the cargo for all general average contributions to the same.

Q.—Have you any lien on the cargo for the shipper's share of the loss?

A.—Yes; the shipowner may hold the cargo for a general average claim.

Q.—What is meant by jettison?

A.—To throw overboard cargo or equipment to lighten or relieve the ship when in danger.

Q.—Under what circumstances is such an act warranted?

A.—When it is done in a storm to lighten the ship, or after getting aground, for the purpose of getting the ship off, its object being the preservation of the vessel and crew.

Q.—Suppose your ship has sprung a leak, your pumps do not keep it under, and other attempts fail, what would you do?

A.—Lighten the ship by throwing some of the cargo overboard.

Q.—What part of the cargo would you throw overboard first?

A.—When possible that part of the cargo which is of least value and greatest weight should be chosen, but such considerations should not be allowed to cause delay where the danger is imminent.

Q.—Suppose the cargo consists of bales of cotton, or of hemp, or wool, with different marks, and shipped by different merchants; what bales would you heave overboard first?

A.—Throw them overboard indiscriminately, and not favour any merchant.

Q.—How are the owners of the lost cargo to be compensated?

A.—By general average.

## TO CLEAR A SHIP AND TO ENTER HER OUTWARDS, &c.

Q.—What documents do you require to sign a crew on?

A.—I would take the ship's Register with my Certificate, and see that the officers take theirs.

**Q.—What documents do you get from the Shipping Office?**

A.—Ship's Register. Articles and Copy of same. Eng. 2, or Return List. Books for account of Men's Wages. Official Log Book. A.A.

Q.—What are the articles of agreement, and what particulars do they contain?

A.—The agreement between the master and the crew. The official form is filled up in duplicate and signed at the Mercantile Marine Office, one part is carried with the ship and the other kept by the Shipping Master. There is also an unsigned copy which must be posted on board the ship in some place to which the crew have access.

The agreement contains the name of the ship, the nature and maximum duration of the voyage, the number and description of the crew, the particulars of the load line, scale of provisions, the capacity of each person, the pay he is to receive, and the time he is to commence work, and must be read to each person before signing.

**Clearing from Home Ports.**—First ship the crew at the Mercantile Marine Office, and get the Superintendent's certificate that the requirements of the Merchant Shipping Act have been complied with, then pay light and dock dues and clear at the Custom House. Before sailing the master should have the certificate of registry, articles of agreement and copy for posting, officers' certificates, official log book, bill of health, manifest, copies of bill of lading and charter party, mate's receipts, letters of instruction, and the return list. The return list must be filled up after the ship has sailed, and be sent back with the pilot, and must state all changes that have taken place in the crew since the first shipment.

Q.—Your vessel is load, what do you do?

A.—Take all my papers to my brokers, who go with me to the Custom House, pay my charges, and get my papers, including a Bill of Health.

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Q.—What **documents** do you take to the Custom House to **clear your ship outwards**?

A.—The ship's register, last light bill, clearance from Shipping Office, called A.A., manifest of cargo, jerking note, cocket card, and victualling bill.

Q.—What documents do you get at the Custom House after you clear your ship outwards?

A.—Port Clearance and Dock Pass, another Light Bill and Bill of Health.

The clearence is the certificate of the Custom House authorities of the last port from whence the vessel came to show that the Custom duties have been paid. The clearance specifies the cargo and its destination.

Q.—Before sailing for a foreign port what document must you get?

A.—A bill of health.

Q.—What is a **bill of health**, and where do you get it?

A.—A certificate from the Collector of Customs, attesting a state of general good health at the port of departure. If bound to a foreign port this document must be verified by the Consul of the country bound to.

NOTE.—If there is no bill of health on board, the ship will on arrival probably be placed in quarantine, and much delay and trouble ensue.

Q.—Where do you obtain your bill of health in a foreign port homeward bound?

A.—From the British Consul at the port.

Q.—Before your pilot leaves you what is done in connection with the Shipping Office respecting missing seamen?

A.—The crew is mustered. The names of any missing seamen are entered on Form Eng. 2, which is provided by the Shipping Office. On the same the names of the substitutes engaged, and particulars relating thereto, are also entered. This form, when properly filled in, is sent with the discharges of the missing seamen to the Shipping Office with the pilot. The pilot also takes with him the names of the missing seamen to the owners or their agents.

Q.—For the information of the crew respecting their agreement, what would you place in the forecastle?

A.—An abstract of the Articles (Form U) containing the scale of provisions.

Q.—What precautions must you take concerning the provisions of the crew.

A.—Have proper weights, scales, and measures, to weigh and measure them.

Q.—What is meant by the expenditure book, and by whom is it kept?

A.—It is a book kept by the master showing the quantity of stores expended by the vessel.

Q.—You enter a foreign port to land a man sick or disabled, describe how you will proceed.

A.—Enter with the quarantine flag flying. The proper officer would board me, and after examining the sick man and the whole of the people on board, should he find nothing infectious, he would permit me to land. I should then go to the British Consul and obtain permission to send the man to the hospital, then land him. The ship's articles must be taken to the Consul and a proper discharge for the man left; and, also, whatever sum of money the Consul should demand for the man's keep and expenses; the balance, if any, will be returned to my owners; and if I wish to ship a man to fill the vacancy he must be shipped before the Consul; afterwards sail at the first opportunity.

Q.—By what **route do you proceed** on your voyage?

A.—By the customary safe route.

Q.—What is the consequence if you deviate from that route?

A.—The underwriters are not liable to pay insurance if the ship be lost.

Q.—Will anything justify you for deviating?

A.—Yes; stress of weather, damage, leak, to join convoy, to avoid an enemy or pirate, and motives of humanity.

Q.—You have to discharge at several ports, in what order will you call at them?

A.—In the order named in the charter; if not named, in geographical order.

Q.—In cases of **wreck** what is the duty of the master?

A.—To save as much of the wreck, stores, and cargo as possible, and the crew must assist him. He must communicate with his owners and underwriters before selling either wreck or cargo. He must also have surveys and protests in proper order to send to his owner.

Q.—Suppose the crew complain of the provisions when in port, what should be done?

A.—A survey should be called on the provisions, and the award entered in the Official Log Book.

Q.—If the crew refuse to go to sea through the alleged unseaworthiness of the ship, what should be done?

A.—A survey must be called.

Q.—Who pays the cost of the survey?

A.—If the ship is found to be unseaworthy the expenses of the survey are to be paid by the owner; but the man or men who complained if the ship is found not unseaworthy. The money can be deducted from the wages when paid off.

Q.—If scurvy should make its appearance amongst the crew when at sea, what would you do?

A.—Increase the allowance of lime juice to two ounces (four table-spoonsfull) per day; give them preserved potatoes or onions, and greens, carrots, turnips, &c., if I had them; a plentiful supply of good water; attention to personal cleanliness, and to cleanliness, dryness, and ventilation in the quarters of the crew, and give them gentle exercise. If in port, get fresh vegetables, water-cresses especially; also, fruits—as oranges, limes, &c.

Q.—When are you to commence to serve out the lime juice, and how much to each man?

A.—On the eleventh day after leaving port; one ounce to each man.

Q.—On **arriving off your** foreign port what would you do?

A.—Hoist my ensign, and also jack for pilot, who will take me into port and give me requisite information about the Port Authorities. When these last board me I will answer any questions they may put to me, and produce such of my papers as they may require to see. If I have a clean bill of health they will likely give me *pratique*, that is, liberty to go ashore.

Q.—Having **arrived** in port, what do you do next?

A.—Deposit the certificate of registry and the articles of agreement at the British Consulate, and note a protest, then enter the ship at the Custom House. The necessary papers are the *pratique* certificate, Consul's certificate, and the manifest.

Q.—On arriving at your **home port** what would you do?

A.—Report the ship at the Custom House; then deposit the articles of agreement and Official Log Book at the Mercantile Marine Office.

Q.—What documents do you take to the Custom House **to enter your vessel inwards?**

A.—The certificate of register, manifest, bill of health, last light bill, list of stores, spare spars, and dunnage deals, a searching note from the customs' officer who has rummaged my ship, and the post office declaration about letters brought by the ship.

NOTE.—The last declaration must be made although you have brought no letters.

Q.—What document do you give to each of your crew twenty-four hours before paying him off?

A.—An account of his wages.

Q.—What document does the Shipping Master give you after you have paid your crew off and paid the charges, and what will you do with it?

A.—A document called "B.B.," which I must produce to the customs' officer when the ship is discharged.

Q.—What is a bill of exchange?

A.—It is a written order or request addressed by one person to another directing the latter to pay on account of the former to some third person mentioned therein, or to his order, a certain sum of money at a certain date.

**NOTE.**—The person giving the direction to pay the bill (*i.e.*, who draws) is called the drawer; the person to whom it is addressed (or upon whom he draws) is called the drawee, and if he accepts it, which is done by writing across the face of the bill the words “Accepted \_\_\_\_\_, payable at \_\_\_\_\_” (the place of payment), he is then called the acceptor. The endorser is the person who, before he can negotiate or pay away the bill, must write his name or the name of the firm (if drawn upon a firm) upon the back thereof. The indorsee is the person to whom the bill has been endorsed, and who is in possession of the bill by reason of such indorsement. The payee is the person or whose firm the bill has been drawn.

Q.—How is a foreign bill of exchange worded?

A.—£1200.

Calcutta, May 1st, 1903.

*Three months after date pay this our first of exchange (second and third of same date and tenor not paid), to the order of JOHN WILSON & Co., one thousand two hundred pounds sterling for value received, as advised by THOMAS JOHNSON & Co.*

To Messrs. WATSON & SON,  
London, Great Britain.

**Remittance and Draft.**—To send money from one place to another, Bank Bills of exchange should be obtained if possible, otherwise those of a mercantile house of the best standing. The bills are made out in a set of three, the first, second, and third of exchange: two of these must be sent by different mails, and the other retained; one of them being paid the others are void. Before sending the bills home endorse them by writing your name on the back, making it payable to your owner.

Q.—Could Messrs. John Wilson & Co. make use of the above bill before the three months had expired?

A.—Yes; they could pay it away by endorsing it, and the second holder could pay it away by endorsing it under Messrs. John Wilson & Co.’s endorsement.

Q.—Suppose you were short of money, and found it necessary to draw £500 from the agents abroad, what would you give them for it?

A.—A draft or bill on my owner.

Q.—What clause would you insert in the bill of exchange to protect yourself from being liable for the payment of the amount in the event of the owner becoming a bankrupt?

A.—I would insert the clause, “On account of ship’s disbursements.”

Advise the owner that you have drawn upon him.

Q.—What accounts would you give to your owner after paying off your crew?

A.—The disbursement and portage bills, with the balance sheet and vouchers.

Q.—What do you mean by vouchers?

A.—The receipted accounts of disbursements abroad. They should be produced by the master to verify his expenditure.

For ordinary disbursements a set of two is sufficient, but for repairs a set of three is required.

Q.—What is the portage bill?

A.—A detailed account of the wages paid to the whole crew for the voyage.\*

\* See AINSLEY’S *How to Keep Ship’s Accounts*, 2s.

Q.—What is barratry?

A.—Barratry includes every wilful act of violence to, or any intentionally wrong appropriation of, or dealing with the ship or goods, or any parts thereof, by the master or other members of the crew of a ship.

A breach of duty, by the master, in respect to his owners, and with a criminal intent, is barratry.

Q.—What is an embargo?

A.—An embargo is laid upon a ship when a government prohibits its departure from a particular port; it is generally laid in view of impending hostilities.

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## MISCELLANEOUS QUESTIONS.

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### JURY RUDDER, CONSTRUCTION OF RAFTS, SEA ANCHOR, HEAVING DOWN A SHIP, &c.

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Q.—You are leaving land to proceed to sea on a long voyage, what would you do with your anchors and cables?

A.—Get the anchors on board and secure them, then unbend the cables and put them away in the lockers.

Q.—You are making the land after a long voyage, what would you consider the most necessary precautions to take?

A.—Have the necessary chains on deck and bend them to the anchors, taking care to place the ends of the chain from aft over the windlass, and take the turns toward amidships. Make frequent use of the lead and keep a good look-out.

Q.—Your mate is taking in cargo in a new ship, what would you caution him concerning?

A.—To keep the pumps sounded at intervals.

Q.—Riding at anchor **on a lee shore with no possibility** of getting under way, what would you do?

A.—Slack both cables out to an end, if sufficient room to do so, and have a good purchase on the cables abaft the windlass, leading well aft. These purchases set well taut would greatly ease the strain on the windlass. Also, send down the topgallant-yards and masts.

Vessels when riding in a roadstead frequently have their windlasses torn to pieces through the chain tightening and then slackening as the vessel is drawn ahead or drops astern. The following plan has strong recommendations as affording support to the windlass:—Reeve a good luff tackle and hook the single block on to the chain close to the windlass on the fore part, the double block being hooked to a toggle in the hawse-pipe, and hove well taut. Another tackle is then put on the chain abaft the windlass, and hove taut also. The one tackle acting against the other will keep the chain always tight round the windlass, and, consequently, prevent the great surging so trying to a windlass and a ship.

Q.—**If forced to run on shore, at what time of tide** would you do so, supposing that you could not do so for a few hours?

A.—At the time of high water, or a little after it.

Q.—You are riding in a small bay with **both cables out to an end, your ship is driving**, and will be ashore in a very few hours, you cannot get under way, nor yet out, there are rocks astern and a sandy beach nearly abreast of you, what would you do ?

A.—Slip the off-chain, and as soon as she canted slip the in-chain, up fore-topmast-staysail, when she pays off drop the foresail, take the sheets well forward to lift her as much as possible, and run for the beach.

Q.—You are **riding in a roadstead by one anchor**, the chain parts close to the ring, the ship is driving towards the shore, dragging the chain, and you have no more bower anchors aboard, what would you do for the safety of all aboard ?

A.—Bend a warp on the kedge, pay it out over the stern, slip the chain, and the ship will then swing to the kedge, thus bringing her stern to the wind ; slip the warp and run her ashore in the best place I could see.

Q.—Your vessel is **lying broadside on to a reef**, you have twelve feet of water inside towards the reef and sixteen outside, what is the first thing you would do ?

A.—Give the ship a list in by shifting the weights on deck (chains, &c.) to keep her from falling off, and so exposing her deck to the sea ; also, to prevent injury to her bottom on the weather side.

Q.—You are ashore, listed, in about 40 feet from the low cliffs, the ship is sure to go to pieces, what will you do ?

A.—Cut away the masts, let them fall on to the cliffs, and thus get ashore.

Q.—Your ship on shore, proceed to take a bower anchor and sixty fathoms of chain out ?

A.—See pages 126-127.

Q.—Your long-boat is not capable of carrying the bower anchor and cable out, how will you proceed ?

A.—Buoy a kedge and lay it out, with the whole warp attached, in the direction it is intended to haul the vessel off, and whilst this is being done, get as much of a bower cable as may be required payed from the vessel's quarter into the long-boat, leaving two or three fathoms in the bows of the boat to shackle to the anchor ; the rest may be stowed in the middle of the boat. Have a piece of spar laid across the stern of the boat and lashed, for the chain to run over, or an old mat nailed over will do as well ; fit good stoppers to the ring-bolt in the stern and after thwart that there may be no possibility of the chain running out of the long-boat faster than required.

Now, if the vessel has two quarter-boats, the bower anchor may be taken out between the two boats, thus :—

The sterns of the two boats should be as nearly square with each other as possible ; a good strong spar (with its flat side down and rounded at the upper part) should be laid across the gunwales of each boat before their centre ; the spar should be well lashed to the nearest standing thwart and fore-and-aft rings, leaving sufficient room between

the boats to admit of the flukes of the anchor going well between them, and the spar so lashed that neither boat could close or separate. The anchor should be lowered between the boats with the flukes perpendicular and the stock horizontal, thus dipping the flukes between the boats, and securing the upper arm under the spar, each boat at the same time keeping her side of the anchor-stock square at her stern; the standing parts of the parbuckles or slip ropes being made fast to the bottom rings, and the running parts rove through separate ones, if possible, and secured with several round turns round the after standing thwarts. Shackle the ends of the chain in the bows of the long-boat to the anchor, which must be well buoyed, and proceed to haul the two quarter-boats out by the warp, which can be done by hands in either boat, the long-boat following, and the cable being payed out as required. When the whole of the chain is laid out, hang the bight of the chain outside the long-boat by a slip-rope to the ring-bolt in the stern, and immediately the anchor is cut adrift from the small boats let go the slip-rope. In this way an anchor may be carried out with the greatest ease. The plan is extremely simple, and can do no injury to the boats if common precaution be taken to have the stoppers in the long-boat fitted in such a way that the cable cannot go by the run; and as the cable should pass over the after thwart the stopper there will be found more useful, but it will be prudent to have two.

Provided the vessel has only one quarter-boat the same plan may be adopted, substituting the long-boat for the other quarter-boat, and placing, if necessary, a sufficient weight (in addition to the cable) to bring her gunwale on a level with the quarter-boat.

Q.—You have command of a passenger ship, what would you do after leaving port with a view to the possibility of any serious accident happening to the ship?

A.—On leaving port tell off men to form a permanent crew to the different boats. Occasionally exercise them in getting the boats ready, and make it the duty of each officer daily to see his boat was in proper order, with everything ready, a plug and also a spare one made fast by lanyards close to each plug-hole for immediate use; the rowlocks, with a lanyard to the foot of each, passed through the rowlock-hole and fast to the inner thwart of the boat, so that in an emergency there should be no searching for them; and, above all, be sure that the boat's crew were trained for each man to look after the proper gear he had to use, so that every man knows his work in case of sudden necessity. See that the fire engines are kept in proper order, and station and exercise crew and passengers frequently.

Q.—If your ship must be abandoned, and your boats are stove or insufficient to carry all your crew and passengers, how would you proceed to construct a raft?

A.—Having collected all the materials I have on board suited to the purpose, such as lower or topsail-yards, topmasts, jibbooms, lower-masts, &c.; I would place the spare topmast in the centre, the jibboom on one side of it, and the topsail yard on the other. I would next reeve a rough topgallant spar through the slings of six empty water

casks and float them on one side of the above spars, another similarly on the other side. I would then place other spars athwart them at regular distances, lashing the lower ones to the upper securely at every crossing on these transvere pieces. I would lay a deck constructed of planks or small spars, or other materials that would fill up, bolting, nailing, or lashing them down as best I could, with six good swifters round the whole. I would erect shears with two light spars, such as two topmast-studdingsail-booms, and hoist a topgallantsail to it, and as a means of steering the raft, a large oar or small spar fitted to a crutch at the after part of the raft will answer this purpose. I would take three topmast or topgallant-studdingsail-booms and lay them on the deck, then drive dogs or staples, one about a foot from one end of each spar, and one about a third from the other end of each; I would pass a lashing slack through these last dogs; then lift one end of the spars up, open out and a triangle is formed. I would now pass a lashing through the dogs at the lower end to keep the heels steady. I would lash from leg to leg of the triangle three small spars close to the lower ends, and also the same number of small spars about two feet from the ends, and drive staples to keep the lashings from slipping; then between the cross pieces I would lash three empty water casks or provision barrels, adopting such methods with cross lashings as will prevent the possibility of their slipping. The raft now being rigged, the upper part being the cradle, I would hitch rope so as to form a sort of network. The raft can be hauled alongside and provisioned.

The first plan of constructing a raft can only be adopted when the ship has little motion, since it would be impossible in a gale of wind or with the ship rolling gunwales over to cast spars adrift for the purpose of rigging a raft; but the second method is so simple, and is at the same time so much in the power of every seaman to construct. In a raft thus constructed a dozen men may find comparative safety; no sea can wash them out. It may be lifted by three or four men and thrown over-board in the hour of need.

**Q.—What are the chief things you will place on the raft?**

**A.—Provisions and water; also, instruments, ammunition, small cordage, carpenter's tools, sails for constructing tents, &c.**

**Q.—Suppose you run short of water, what means would you take to alleviate thirst?**

**A.—I would keep the clothing damp with sea water.**

**Q.—Your rudder being carried away at sea, what is the first thing to be done, and how would you proceed to construct a temporary one?**

**A.—The first thing to be done on losing a rudder is to bring the ship to the wind by bracing up the after yards. I would meet her with the head yards as she comes to. I would take in sail forward and aft, and keep her hove-to by her sails. A vessel may be made to steer herself for a long time by carefully trimming the yards and slackening by the jib-sheets or the spanker-sheet a little as may be required. Having got the ship by the wind, get up a hawser, middle it, and take a slack clove-hitch at the centre. Get up a cable, reeve its ends through this hitch, and pay the hemp cable out over the taffrail. Having payed out about fifty fathoms, jamb the hitch and rack it well, so that it cannot slip; pay out on the cable until the hitch takes the water; then**

lash the cable to the centre of the taffrail; lash a spare spar under it across the stern, with a block well secured at each end, through which reeve the ends of the hawser, one on each quarter, and reeve them again through blocks at the sides, abreast of the wheel. By this a ship may be steered until a temporary rudder can be constructed, which may be done thus:—Let a spare topmast be cut to the required length of the rudder stock, making the heel of the mast to answer for the rudder head; use the remainder for the after part of the rudder, and leave a space near the lower end of the stock wherein to stow a quantity of shot, pig-iron, or the like, as ballast to assist in keeping the rudder end on. Plank it up on both sides with slabs or deals, bolted or nailed to the main and after parts of the rudder, and let there be a strong shoe-piece bolted horizontally under all. Let the main piece have two mortice holes cut in it, one near the lower rudder-iron, the other about two-thirds up, through each of which pass a chain with a round turn, and carry the ends of these chains forward along the ship's counter, so that their crossings (which must be seized) may lie against or embrace the stern-post. Clap tackles on the ends of these chains, and bowse them taut forwards in order to bind the rudder firmly against the stern-post. For greater security, also, the rudder may be hung by rope, or a small chain passed through the fid-hole of the topmast and made fast round a bar laid across the rudder-hole on deck. Bolt two spars to the upper end of the broad part of the rudder, one on each side, and lash them together in order to form a tiller projecting out from the rudder at an angle of elevation; make fast the tiller ropes to its outer end, and lead them to the steering wheel.

Let a spare topmast be cut the required length of the rudder, and take an iron band of sufficient size\* for the lower end of the topmast to travel in; the band, if too large, can be woolded round, and should always be leathered to prevent chafe. Next, take a lower cap, and enlarge the square hole to fit into the stern-post; the round hole is for the upper part of the topmast to travel in.† Take a jibboom and cut it in two, or take other pieces of spar and bolt the pieces on abaft the topmast, after squaring the edges which are to come in contact with each other, and cutting a score in the forward part of the jibboom or spar next to the topmast, at the lower end where the iron band comes, so that the working of the rudder may not be impeded; plank the whole over with stout oak planks, slabs, or deals, according to materials, and bolt in a fish abaft all. A tiller can now be fitted. The band of iron for the heel of the rudder will require a chain on each side to reach nearly to the fore-channels, and, if the material be at hand, have two eye-bolts in this band for the purpose of securing the chain to.

\* The iron band that goes round the mizzen-yard will answer the purpose, or a spare cap cut away at the after part, so as to fit the stern-post at the water's edge or a little below, may be used instead of the iron band; the topmast being passed through the round hole of the cap.

† If no cap can be had, secure two spars or planks athwart the deck and parallel to each other over the rudder trunk; also, other two spars or chocks fore-and-aft ways over the rudder trunk, and in each case sufficiently apart that the rudder-head will go through, and have these leathered or rounded where they touch the rudder-head to prevent chafe.

Also, have a small piece of iron plate nailed to prevent the band from working upwards. At the fore-channels attach two tackles to the chains to bind the iron band close to the stern-post. Have a kedge with a slip-rope to sink the rudder, which, being put over the side and brought to the rudder trunk, can easily be hauled into its place; haul the chains taut forward, one on each side; put the cap on; ship the tiller, and put a lashing on each side of the rudder-head to the deck to keep the rudder from lifting. (*For Steamers see page 196.*)

Q.—How would you construct a sea anchor?

A.—This anchor may frequently be of the greatest possible use; it ought to be made in the following manner:—Take three spars, or top-gallant or studdingsail-booms will be sufficiently large; with these spars form a triangle, the size you think will be large enough when under water to hold the ship; cut these spars to the required length before or after cross-lashing them well at each angle, so that they will bear an equal strain when in the water; but should your spars be weak you should always increase the number of your spars according to their weakness; fill up the centre of the triangle with strong canvas, having eyelet holes round its side about three inches apart, to which eyelet holes attach the canvas well to the spars; at the back of the canvas pass many turns of an inch or inch and a half rope, net fashion, of course. A proper net would be preferable to a rope so expended. To the base of the triangle attach a weight or small anchor, supported in the centre of the base by a span running from each of the lower angles. To the first mentioned spans make fast the stream cable; when everything is quite ready hoist it overboard from the place you think it will answer best. There is every reason to believe, with this anchor under the trough of the sea and 70 or 80 fathoms of stream cable out, that a ship's drift would not be very great.\* The plan proposed would be of the greatest advantage to dismasted vessels, and vessels which have lost their rudders, &c. If a vessel should approach the shore with this sea anchor down, it would enable her to bring-to with her proper anchors much easier than if the sea anchor had not been down. She might let go her proper anchors and veer from the sea anchor until she had sufficient cable out, which would give her a much better chance of holding. The sea anchor should have a buoy and a buoy-rope sufficiently long to go well under the trough of the sea.

Q.—Your vessel springs a leak, what will you do?

A.—On finding a vessel is leaky, the first step to be taken is to discover as nearly as possible the situation of the leak, then try to get at it, and stop it, either outside or inside.† If that cannot be done fother

\* The contrivance above appears preferable to riding by spars, as the spars drift so much faster than the sea anchor, from its being well under the trough of the sea, so makes great resistance to the drift of the vessel. The reason why the triangular form is proposed in preference to the square is, that the trough of the sea may strike as lightly as possible should the upper angles at any time approach the trough of the sea while riding at anchor. The square might certainly be so placed as to have one of its corners up in the same manner as the triangle, but then you would have the base in the very place you want the greatest resistance if you make a square.

† To effect this many plans have been suggested. The most practical of these appears to be—first, to examine such accessible parts as are most likely to be defective,

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it, that is, get a sail and fasten chopped oakum or other suitable matter slightly to one side of it, make ropes fast to the four corners, and pass the sail under the bottom over the leak.

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### HEAVING DOWN A SHIP.

Q.—Requiring repairs abroad where there are no docks, you are obliged to heave your vessel down. Give a detailed account of the way you would proceed in the operation.

A.—In preparing to heave a ship down, unrig her to her lower-masts and bowsprit. Get everything movable from between decks,

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as the wooden ends forward and aft, the butts of the planks, and round the fastenings. Should no discovery of the leak be made, the ship must be tried before the wind, and on both tacks by the wind. If the leak increases before the wind the leak is forward, probably in the wooded ends; if it decreases it is in the stern; if the leak be greater on the starboard tack, then the leak is situated on the port side, and *vice versa*. A leak in the bows, or on either side, may be lessened by a thrummed sail being put over the part defective; but this mode is not applicable to the stern, as the vessel's way through the water would prevent its action. A leak situated much below the surface can only be stopped from the inside except in the way named —of a thrummed sail; therefore the cargo in the neighbourhood of the leak must be removed, and the ceiling cut away so as to expose the part. Pieces of deal must then be made as nearly as can be of the shape of the room or rooms between the timbers, but so much less as to enable the pieces to be thickly covered with oakum, as spun for caulking; the pieces thus prepared should then be thoroughly tarred and put into the places where the leak is situated, and a piece or pieces of plank or spar bolted to the timbers to secure them in their situations. The force used in this operation must entirely depend upon the state of the outer plank and fastenings, for if, from the decay of the plank or timbers, the fastenings were to give way, the plank might be partially removed from the timbers, and the consequences fatal; but caulking may be done between the timbers and the pieces, and (but with more care) between the upper and lower parts of the pieces and the outer planks; by these means the leak would be much lessened, even should it be situated in the plank and timber, and if in the room its communication with the vessel would be entirely cut off. This mode of treating leaks is evidently one adapted to those only of comparatively small dimensions, but it is applicable to such leaks, however situated, if approachable. If from faulty caulking, the vessel be generally leaky, the thrummed sail is the only remedy, and the pumps must be constantly and vigilantly attended and worked to prevent injury to the cargo, and for the safety of the vessel and crew. The pressure of water at different depths is but very partially known to many seamen, and many have expressed the greatest surprise and doubt respecting the matter. First—water presses at its base and altitude; the hole or aperture admitting the water may be considered as the base, and the depth of the hole from the surface the altitude. Second, the quantity of water admitted into any holes or apertures of the same dimensions will be as the square roots of those depths from the surface, that is, of such numbers as multiplied together would make such depths; thus at 25 feet five times as much water would be admitted as at one foot; at 16 feet, four times; at 9 feet, three times; at 4 feet, twice; and always in those proportions; but when the water has risen in the inside of the vessel, the quantities of water admitted will be as the difference of the square roots of the surfaces inside and outside. This circumstance will show that pumps which are not powerful enough to prevent the water rising in the hold to a certain height may be quite sufficient to prevent any further increase, and thus, with a cargo that water could not destroy, a ship might be safe with many feet of water in her hold, and *ought not* to be abandoned. It is quite probable that want of information on this very important matter has caused the abandonment of many vessels that might have been saved. From what has been stated it is plain that a leak situated near the bottom of a vessel is, independently of its being more difficult of access, more dangerous than one near the surface,

lower hold, and upper deck, and remove everything not absolutely required for the operation either to other vessels or ashore. Every opening should be closed; pieces of plank should be nailed over felt or canvas on the bull's-eye on the deck, and have the top sides well caulked on the side to be hove down. Rig pumps down the hatches to the lee bilge, with platforms rigged to them. If spare pumps are not on board I would take the ship's pumps and use them for the purpose. Have stages, stage ropes, oakum, &c., and everything the carpenters will require, all ready to commence work immediately the ship is hove down, that the straining may be as little as possible.

Knock out the wedges, slack the lee-rigging, and get the masts well over to the opposite partners or side to be hove out, and then have the masts fished and shored from the water-way by two spars, shear fashion, crossing under the trestle-trees, with a strong lashing round the mast, with plenty of parcelling, taking care that the shores do not touch the trestle-trees, as the strain may injure or displace them; shores also being put under the deck to take off the strain from the partners on the opposite side to that to be hove out. Get up as much preventive rigging as is deemed necessary, and should a heavy heave be anticipated, get out one or two out-riggers at each mast across the gunwale to be the upper one, taking out the lower plank of the bulwark for that purpose, with martingales down to ring-bolts driven into the ship's side as low as possible, and with a good spread, or passing completely round the keel and make securely fast at the other side; get stays from the out-rigger ends to the mast-heads, securing the purchase-block aloft by two long lashing-eyes, the eyes coming round and lashing on the same side as the block; also, another lashing round the mast under the eye to prevent the eye-block from jambing under the top.

Every precaution being taken to have all well secured, have the lower rigging and out-rigger shrouds set up to a fair and equal strain, and then wedge the shores up till a little strain is taken off the rigging. Having got everything ready for heaving down, the vessel must be moored head and stern, and an anchor laid off on the side to be hove out, the hawsers or stream chains from which must be passed under the bottom and fastened to the side to be hove down; this will keep the vessel from closing in on the vessel, lighter, or quay she is to be hove down by, and will save much heaving. When the ship is hove off, bowse in the chain, reeve my purchase, and heave her down to the rings or bolts on the wharf. When the vessel is down preventers must be passed round the mast-head, and the tackles eased of their strain.

When heaving down keep an equal strain upon all the warps; they must not be surged; when necessary to fleet them, stopper them, and walk back the winches.

Q.—If you had to heave down by another vessel not prepared for the purpose, how would you prepare your lower blocks to bear the necessary strain?

A.—Should there not be a wharf or a hulk to heave down to, another vessel must be used for the purpose, using caution in preparing a place for the lower block, since there is nothing about the deck of an ordinary vessel that will bear such a strain. Both vessels will of course be

moored parallel to each other, and their breasting off anchors placed in opposite directions. If the vessel to be hove down to has hatchways opposite to our mast heads, have a heavy spar placed under the lower deck-beams well secured with diagonal shores, and use this for the lower block. If the vessel is much smaller, the strop for the foremast block must be passed through the hawse-holes and round the cutwater, and the after one in the hatchway, as just described. If the vessel is small pass a chain completely round her as the best way to secure the lower block.

Every precaution must be taken that the distance of the lower-blocks be exactly the same as that of the upper ones; for should it be otherwise, it might be necessary, when nearly hove down to ease up, in consequence of the unequal strain on the preventive shrouds.

Q.—You have effected the necessary repairs, how will you ease your ship up again?

A.—Man the heaving down capstans, and walk them back so as to ease the ship regularly without jerking the masts, as lowermasts are more liable to be carried away in easing the ship up again than in heaving down, by the jerks in surging the falls, if you do not walk steadily back with the capstans.

Q.—What **precaution** would you take to **prevent** the ship from **going right over**, and to **assist** (if required) in **righting** when **repairs are finished**?

A.—To prevent the ship from capsizing two warps are taken from the shore or barge, as the case may be, passed under the ship's bottom, brought up on the off side, and made fast on board ship. As the vessel is hove down these warps are gradually eased. If the ship will not rise herself the warps may be used as purchases to raise her. Otherwise: take a warp, middle it, pass it under the ship, so that the bight is on the side to be hove down, then pass the ends through the bight, and so clinch it on the lee side. Then, if the ship will not rise, I could parbuckle her up with this warp.

NOTE.—While every precaution is taken for a heavy heave, it must not be forgotten that some ships of a peculiar build may fall over after arriving at a certain inclination; if this is suspected, tackles must be got to the mast-head of the other vessel, ready for use if necessary, which may be easily known by the lightness of the heave.

Q.—If you had to **heave down**, say a mile from the shore, and no barge or hulk, what would you do?

A.—Make a raft, moor it well, and weight it as heavy as possible. The lashings for the purchase block must go all round the raft.

Q.—You are about to make the land, or nearing shoals, it is night time, and the ship's position is not certain?

A.—Keep on the safe side, steer an outward course, pay great attention to the lead, look-out, and compasses, and, if possible, keep the ship upright to avoid heeling deviation.

Q.—You are navigating by dead reckoning, and on getting an observation find yourself 30 miles out, how do you account for that?

A.—The error may be due to errors in the log or glass; improper allowance for deviation, variation, or leeway; bad steerage; or to an unknown current.

## QUESTIONS RELATING TO STEAMERS.

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Q.—You have a fresh crew, what will you teach them first ?

A.—To drive the steam winches.

Q.—In what position must the man stand who is driving the winches ?

A.—His hand must be near, or on, the throttle-valve, his right hand on the slide-valve lever, and one foot near the brake.

Q.—When leaving winches under steam what precaution would you take ?

A.—Shut the throttle-valve and open the drain cocks in the bottom of the cylinder, to allow the condensed steam to escape, otherwise, when starting again, I might split the cylinder bottom.

Q.—How should a steamer's ventilators be trimmed ?

A.—So that the weather one for the time being shall be the uptake.

Q.—What are **water ballast tanks** ?

A.—They are tanks built inside the vessel, and frequently form a portion of the vessel itself; they are filled with water which serves as ballast.

Q.—How are they **filled** ?

A.—By opening the sea cocks, which allows the sea water to flow into them.

Q.—How are they **emptied** ?

A.—By the donkey ballast pump.

Q.—Describe the latest form of construction as regards the inlet for water of ballast tanks ?

A.—In the newest construction of ballast tanks there is only one inlet for the water, this inlet being through a valve box placed in the engine room, and all the ballast tanks lead into this box, which is well marked, viz.:—Fore hold, main hold, after hold, &c. No water, therefore, can pass into the tank unless it comes through this valve box in the engine room; each tank having a separate pipe leading from it to the valve box. These pipes are also connected by valves leading to the donkey engine, and are used to pump the water out of the tank. There are also sounding pipes fitted to the tanks which ought to be frequently used when the ship is full of cargo.

Q.—Who has the control of the ballast tank ?

A.—The engineer.

Q.—What **precaution** would you take when **filling the tanks**, and why ?

A.—Take great care that they are quite full, for if not completely filled it causes the ship to roll heavily, and brings great strain upon the tank top.

Q.—How do you know when the tank is **quite full**?

A.—Keep the sounding pipe cover off, then when the water tank is nearly full the water will commence to fly several feet above the deck, but will gradually subside till the sounding pipe is full to level of the deck, when the tank will be quite full.

Q.—What are the **advantages of water ballast tanks**?

A.—When moving a ship from one port to another in ballast it saves the expense of buying, loading, and discharging ordinary ballast, and also the loss through detention in both operations; because opening the water ballast cocks allows the water to run in as the ship goes along, and as she is approaching her port she begins to discharge it through her donkey ballast pump.

Q.—What **disadvantage has water ballast tanks**?

A.—When the ship is loaded and the tanks are empty her cargo is too high, thereby making her crank.

Q.—What are **water-tight bulk-heads, and what are they for**?

A.—They are strong iron partitions built inside the ship, extending from side to side, and from the under part of the upper deck to the bottom of the hold. By this means the hold of a vessel is divided into several water-tight compartments, so that in case of leakage in any one of them the water is confined to that compartment.

Q.—Describe **any arrangement of sluices** you know of?

A.—The water ballast tanks of steamers are seldom carried into the sides of the vessel, consequently, between the outside of the tanks and the sides of the ship there remains a space of about eighteen inches in width, and extending fore-and-aft of the tanks; this space is constructed as a water way, and in which are the sluices. This mode of construction is intended to afford means of getting the water to the engine room if the ship is damaged or holed above the tank tops.

Q.—Where are the **sluices placed**?

A.—The sluices are placed at the after end of the tank sides in the fore holds, and at the fore part in the after holds, and are situated at every water-tight bulk-head fore-and-aft on both sides of the ship.

Q.—What are the **sluice valves**?

A.—They are sliding doors or valves on the lower parts of the water-tight bulk-heads, which, on being opened, allow the water to be drained from one compartment to another, if required.

Q.—How are the **valves worked**?

A.—The valves are connected to vertical rods that lead to the upper deck immediately above the sluices, and by fixing a key upon the heads of these rods and turning them the valves are opened and shut. The rods are covered by brass water-tight caps on the upper deck, and are marked so that it is seen when the valves are open or shut, and that duty devolves upon the carpenter of the vessel.

**NOTE.**—Modern steamers have a pipe laid from the limbers to the engine room, thus doing away with sluices.

There ought to be a sounding pipe at every sluice, so that the holds can be sounded every four hours. The waterways to the sluices should be frequently cleared out, as they are the only means, excepting the hand pump, of getting clear of any water in the hold when the ship is full of cargo.

**Q.—Explain the action of the rudder of a screw ship with regard to speed, and a large or small angle of rudder?**

A.—The great thing to remember is this, that when a ship is answering her helm it is the stern being thrown round by the pressure of water on the rudder which alters her course, and that it is the head which is governed by the stern and not the stern by the head; so much is this the case in screw ships able to give a large angle of helm, that if the helm be first put hard over and the engines started ahead, the ship will turn two or three points before gathering way.

As a general rule it may be stated that screw ships turn on a point one-third before their centre; therefore, in avoiding collision, when nearing the danger, steer so that your bow may go clear; having done this, as the point on which your ship pivots passes reverse the helm, and by so doing endeavour to throw your stern clear. The more helm given the smaller will be the diameter of the circle made; the more speed used with the same helm the quicker will you turn though describing a larger circle.

**Q.—What is meant by a right-handed screw propeller?**

A.—Right-handed propellers are those which turn the same way as the hands of a clock, the observer being placed abaft the clock whose face is turned aft. They revolve from port to starboard of the ship during the upper part of its revolution while the ship is moving ahead.

**Q.—What is meant by a left-handed screw propeller?**

A.—A left-handed propeller is one which revolves from starboard to port of the ship during the upper part of its revolution when forcing the vessel ahead.

**Q.—With helm amidship, and vessel going full speed ahead with a right-handed screw propeller, on which side of her course will the ship's head go?**

A.—A right-handed screw propeller tends to send a ship to the port side of her course, the effect being as if she carried a starboard helm.

**Q.—What effect has a left-handed screw propeller on a ship with helm amidship going full speed astern?**

A.—To throw her to port of her course; that is, a steamer's stern under these circumstances will turn to starboard.

**Q.—What effect has a left-handed screw propeller upon a ship going ahead?**

A.—To throw her to starboard of her course.

**Q.—How will a steamer's stern turn when you reverse the engines with a left-handed screw propeller?**

A.—It will turn to starboard.

Q.—Can a steamer be **steered to go straight astern?**

A.—A steamer cannot be steered to go straight astern no matter what precautions are taken, as her propeller in the end, if unaffected by tide or current, will eventually put her athwart, and, if at sea, turn her completely round. With a right-handed propeller she will come round to starboard all the time, and the reverse with a left-handed propeller.

Q.—Coming astern, you want a steamer with a right-handed propeller to come to starboard with her bow, how will you put the rudder?

A.—Hard-a-starboard with a right-handed propeller.

Q.—With a left-handed propeller, coming astern, you want her head to come to port, how will you put the rudder?

A.—Hard-a-port.

Q.—You are in narrow waters, your vessel has more way on her than will pass the object, and too much to stop her before reaching it, what precaution would you take in respect to the helm?

A.—With a right-handed propeller I should take great care not to give the vessel too much port helm, because if she will not clear the object by going ahead, full speed astern will cause her to fly to starboard and make worse of it. With a left-handed propeller a ship should be very carefully watched in giving her starboard helm, for if she will not clear by going ahead, full speed astern will make matters worse.

NOTE I.—If you wish to cant to port with a right-handed propeller, it cannot be done by going astern, as it matters not which way the helm is put, if the vessel has little way on her she will go to starboard, and the reverse of this will occur with a left-handed propeller; if unaffected by the tide the vessel will pay little attention to the rudder at first, but the rudder must be used to help her round directly she begins to get sternway; or, in other words, the rudder is of no use to a screw steamer till she gets sternway upon her, for she will begin to cant before the rudder becomes useful. In these remarks it is supposed that the vessel is uninfluenced by wind or tide, as either of these may produce a contrary effect. Wind or tide will cant steamers, especially light ships, against their propellers, and it must be borne in mind that whichever way they first begin to cant they will continue to do so to the end; that is, when going astern.

NOTE II.—Prof. REYNOLDS has pointed out a very peculiar result which follows the reversing of the engine.

If a vessel which is in motion has its engine suddenly reversed, and the helm be put over before way is off the vessel, the head will fall off in exactly the opposite direction to that it should do from the position of the helm. It is thus explained:—

Suppose one vessel in danger of collision with another approaching on its starboard bow. If the helm is starboarded, and the engines at the same moment reversed in order to stop the way of the vessel, the water is driven away from the fore side of the rudder and an increase of pressure produced upon the after side, driving the stern to port, and the vessel therefore turns to starboard and the danger of collision increased.

Q.—You are in a screw steamer at sea with a right-handed propeller, which is the quickest way in turning her short round?

A.—She turns quickest with her port helm, thus :—Going full speed ahead, put the helm hard a-port, and when on full swing of port helm stop the engines, and when she loses way bring the engines full speed astern, and reverse the helm by putting it hard a-starboard, and she will in this way come quicker round than she will by going ahead at full speed with either helm.

Q.—You are in a narrow channel in a steamer with a right-handed propeller, there is a strong tide in mid-channel and slack water on your port side, how would you turn her round?

A.—Put the helm a-starboard to bring her into the port side of the channel; when all clear put the helm hard a-port, full speed ahead, which will bring her port bow into the tide; stop her, change the helm, full speed astern to keep her stern in slack water; then hard a-port and full speed ahead until she comes round.

Q.—Coming down a river before the tide, and it becomes necessary **to bring your vessel to a sudden stop**, how will you proceed?

A.—Give her a slight sheer to port and bring her full speed astern, then the ship will straighten herself end on to the tide; when she has lost her way drop your anchor and swing round.

Q.—A screw steamer **under the spouts, or against a wharf, what precautions** would you adopt?

A.—Have fenders over the side to prevent chafe. Have a bow and quarter rope to secure her.

Q.—You are lying alongside a wharf, wind blowing hard, and the vessel is ranging about, what would you do?

A.—Get springs from head and stern.

Q.—In getting under way, what should be seen to before starting the engines?

A.—Having a report that everything is clear about the engines; the engines, if possible, being turned over the centres both ways, ahead and astern; the officer in charge of the deck to see that all the water in the deck pipes leading to the winches and windlass is blown out, and that the winches are well lubricated before starting; see that the wheel chains are in perfect order by putting the helm hard over to port and starboard. If steam steering gear is used it should, with the assistance of an engineer, be well looked to before starting. See that no boats are near the propeller, and in getting under way from a quay or wharf it is indispensable to have an officer aft to see that all warps and chains are kept clear of the propeller, being careful to haul in the slack of the quarter rope as it is eased off. If possible, time should be allowed to allow the stern rope to be hauled in before moving the engines.

Q.—A screw steamer moored to a buoy in a river behind a broad tier of ships, and you want to get under way with your own steam only, there is a dolphin aft of you, how would you proceed?

A.—Take the ship out under sternway; then, if it is a right-handed screw propeller, she will have a tendency to cant to starboard, therefore, give her a sheer before starting so as to bring the current on the starboard bow, when the tide would act against the effect of the screw, and the ship would have a better chance of coming out in a straight course.

Q.—A steamer alongside of a wharf, proceed to get her under way, head on to the tide, and wind astern.

A.—Slack the bow line and hold on aft to let the tide in between the ship and the wharf, and when her bow falls well off, hold on forward and slack away aft; see the propeller clear and proceed on.

Q.—A steamer alongside of a wharf, stern on to the tide and wind ahead, proceed to get under way?

A.—Hold on forward and slack away aft, when her stern is well off "Easy astern" the engines, and let go forward.

Q.—How would you **bring a steamer alongside a hulk in Gibraltar Bay with the wind down?**

A.—Take a good sweep round her starboard side and come easy up on her port side, starboard the helm, stop, and come astern, then she will drop alongside. If any sea, some prefer to steam a little ahead of her and let go the port anchor, slack away while the engines are coming astern, get your rope aboard and heave your vessel alongside.

Q.—You are in a screw steamer crossing the Atlantic, the propeller comes loose, what will you do?

A.—Keep the engines going, don't ease her. If you stop or go astern the propeller might drop off.

Q.—How are **orders from the bridge usually communicated to the engine room?**

A.—By means of the engine room telegraph. The orders are transmitted by means of small shafting and gearing to index hands or pointers which work over dials suitably engraved. A loud gong is fitted in the apparatus, the hammer for which is worked by a sprocket wheel on the index spindle to call attention to the meaning of the telegraph. Reply gongs are fitted to indicate to the officer on deck that the order has been received and acted upon.

Q.—How is the dial marked?

A.—Usually with the words, "*Stand by*," "*Easy ahead*," "*Half speed ahead*," "*Full speed ahead*," "*Stop*," "*Easy astern*," "*Half speed astern*," "*Full speed astern*."

Q.—You are in a long steamer, and your masts are far apart, consequently your yards are not of any use for discharging heavy weights, you are in an open roadstead or a position where no shore appliance can be got to help you in discharging a heavy piece of machinery, say about thirty tons weight; describe how you proceed to rig purchases to lift it.

A.—At the after part of the hatch rig a pair of shears, standing athwartship, one on each side of the deck, which are to be used to lift the piece of machinery from the hold to the upper deck; then to get it over the ship's side have another pair of fore-and-aft shears rigged and placed on the opposite side of the deck to that on which you are going to discharge. Be careful to place the shears on deck beams, which must be securely shored up below the upper deck; also put good cleats on the shear lashing at the shear heads to prevent them slipping; next, rig out through the ports two large spars, projecting, say, about twenty feet outside her broadside, and which must be securely lashed. These spars are to be fitted with heavy purchase blocks at their extreme ends, which are to be used to bowse the article you are discharging clear of the ship's side. After heaving up the piece of machinery by the athwartship shears until it is level with the upper deck, lash on the lower purchase block of the fore-and-aft shears, and secure to this lashing the tackles connected to the spars for bowsing out; heave away upon the athwartship shear purchase until it is a few feet above the rail, then hang that purchase off and belay it; next, take the fore-and-aft purchase to the winches and haul away upon the tackles fast to the spar for bowsing out, which will take the machinery clear of the side, and at the same time keep slackening away upon the athwartship shear purchases till the fore-and-aft purchases have all the weight, then lower away.

It will be necessary to use great care in securing the heels of the fore-and-aft shears; have them well cleated and secured with chains to prevent them lifting. The topping lifts of these shears should be taken one aft to the mainmast the other to the foremast, and slackened away till the shear head plumb the rail. For greater security, if afraid that the topping lifts have too much drift, have two heavy preventer topping lifts taken from the shear heads underneath the bottom of the ship and securely fastened on the upper deck on the other side. This latter precaution will seldom be necessary.

Q.—You lose your propeller, say in the Suez Canal?

A.—The spare propeller is generally carried in the after hold. Take the cargo out aft to get at the propeller and the ship will rise aft, lift the propeller out of the hold and place it in a lighter then by means of tackles hooked on to the eye-bolts in the quarters, or to a beam across the deck aft, place it in its position.

Q.—Suppose you are in a steamer near the land and fall in with another steamer with her rudder gone but engines all right, and you have engaged to render assistance, would you take her in tow?

A.—No; as the engines are all right make fast astern of her, by which means I could assist her in steering easier than by taking her in tow.

Q.—You are in a steamer and **fall in with a ship in distress, the crew of which signal you to take them off**, how would you proceed?

A.—Get my vessel to windward of the vessel in distress, and if I can with safety put out a boat, give my vessel a broad sheer, launch the lee boat, and slack her down with a line to the wreck; if this precaution is used two men will be sufficient to man the boat, the men to have cork life-belts on, one man to tend the line in the boat's bow and the other tending her with a long steering line over her stern. In veering away the line great care is necessary, watch the sea and veer away as circumstances permit, for if the line is veered away too fast the boat may turn athwart the sea and capsize.

*Another way.*—Get my vessel to windward of the vessel in distress, and when near enough launch the lee boat (this boat must be equipped with oars, compass, sea anchor, and line, oil bags, oil, water breaker, provisions, rockets and blue lights, &c.) and give the officer in charge instructions with regard to signals and to board the wreck on the lee side. If there is much wreckage about, and not possible to get alongside, throw a heaving line on board and haul the men through the water into the boat. I would then go under the lee of the wreck to pick the boat up.

**NOTE.**—The best position to place a steamer near a disabled ship is to windward of her, because, in the first place, communication is easier effected when in this position; and, secondly, as wreckage is generally floating away from the vessel it might foul your propeller if you were to leeward of her.

Q.—How would you proceed if you have a **heavy tow** with a strong sea running?

A.—Take the cable chain of the vessel you are going to tow out of one hawse-pipe and put it into the other, leaving a bight of about twenty fathoms. In the middle of the bight, after it is well parcelled, make fast your towing hawsers, and veer them out to the bare ends. If blowing hard and a strong sea, endeavour to keep your vessel with as little way as possible lest you should carry away all your hawsers.

Q.—Your vessel is to be some time under canvas, what would you do?

A.—Disconnect the engines and let the propeller revolve; but if it is only for a temporary breakdown, then place the propeller (if a four bladed one) with two blades up and two down.

Q.—If on a lee shore, and your engines become disabled, what would you do?

A.—Try all means to cast her on the best tack with her canvas; but if she will not pay off on either tack, as is sometimes the case, and, if in soundings, as a last resource, let go the anchor, and when she comes head to wind try and cast her with the head sheets and slip the anchor.

Q.—When blowing hard with a heavy sea, and you wish to lie-to, how will you proceed?

A.—Double-reef the mainsail, set it taut and haul the boom flat amidship, ease the engines down to slow, or just sufficient to give her steerage way; then keep the sea two or three points on the bow just so that the mainsail will keep full; if the vessel lies-to badly on this

tack try the other tack, and bring the sea on the other bow; if she now falls off too much into the trough of the sea, put more after canvas on the ship if possible, and turn the engines a little faster; if all these plans fail, and you cannot run before it, recourse must be had to a sea anchor.

Q.—What would you do to **lessen your steamer's drift, and keep her out of the trough of the sea?**

A.—Get a good hawser and middle it, and lash a spar along the middle or bight of the hawser, take one end of the hawser into the hawse-pipe and the other into the bow-pipe, and let the vessel ride by this. If this will not bring her up sufficient, pay a few fathoms of hawser chain out of the other hawse-pipe.

Q.—In heavy weather suppose your engines broke down, how would you keep the vessel from falling into the trough of the sea?

A.—Rig a sea anchor (see page 192); but if studdingsail-booms are not to be had, boat oars may be used instead. Get nine boat oars, lash them together three and three, two blades one way and loom the other; then form a triangle by lashing the three lots together, and lash or lace the strongest canvas you have to the triangle, backed with small line net fashion. Take a hawser, and, at a distance equal to double the length of the triangle from the end of the hawser, seize a thimble or bull's-eye, and bend the ends of the hawser to one end of the triangle, also bend the ends of a good rope of suitable length to the other two corners of the triangle. Take a small kedge anchor, or ballast, and make it fast on the side opposite the corner the hawser is made fast to. Having all things now in readiness, drop the whole overboard, and slack away as required. When it is required to be taken in let go the rope and take the hawser to the winch and haul in; the machine is then nearly flat, and can then be easily brought alongside and taken on board.

Q.—At sea, a fire breaks out on board your steamer, what will you do?

A.—Stop the vessel immediately; and, if the fire is aft, endeavour to keep her head to the wind with as little way on her as possible, so as not to increase the draught; if the fire is forward, keep the vessel before the wind and stop the engines. Prevent air from getting to the fire by putting on all hatches (if they are off), and blocking up the mouths of the ventilators, and stopping all holes and crevices. While this is being done cut a hole where you think the fire is (the hole should, if possible, be below the level of the fire), turn on the steam, filling the hold with steam, which will smother the fire out. Otherwise: Having cut a hole, as before stated, sufficiently large to admit the nozzle of the hose, and keep playing upon the place where the fire is supposed to be situate, open the sluices so that the water will find its way into the engine room and thus be discharged overboard. If the fire is found to decrease, great care must be taken when taking the hatches off, as a very little air may fan a smouldering fire into a blaze. If the fire still gains on you when all the deck hose are on, get the boats ready and

provisions in them, and see all clear for saving life. If the fire is gaining rapidly, and the vessel is in a position to be run ashore, as a last resource run her ashore, and open all sluices and sea cocks to scuttle her.

Q.—How would you rig a jury rudder for a steamer?

A.—Take the main-boom for the main piece of the rudder, and then take the fore derrick and cut it in two, and bolt these on each side of the main-boom to form a blade; load this with any suitable weight, such as an iron anchor stock, &c., and frap it round with runner chains. Have a spar (say the fore-boom) to go athwart the quarters with a block on each end; take a good stout hawser and pass two turns round the barrel of the winch, and lead the two ends aft through the blocks to the end of the main-boom; launch the machine and secure the end to the cross spar with lashing, but with sufficient freedom to move, and steer her by the steam winch. Also, have a derrick rigged aft with a block on the end of it into a hawser passed through it to the end of the main-boom to lift the whole affair out of the water if it is required to stop the vessel or go astern.

Q.—Suppose the sea carries this spar away, what would you do?

A.—I would make a canvas bag similar to the life boat drag, having it well roped round, and the mouth kept *open by a wooden cross*, then bend the hawsers on to it from each quarter, and steer with this; have a tripping line on the small end to trip it up if required.

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# REGULATIONS FOR PREVENTING COLLISIONS AT SEA, &c.

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NOTE.—*Candidates for Examination, of all grades, are required to have a thorough knowledge of the following Regulations, and must be able to repeat them word for word, either in or out of their regular order.*

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*On and after the 1st July, 1897, the Rules contained in the Schedule to the Order in Council of 11th August, 1884, with the exception of Article 10, will be annulled, and the Rules contained in the Schedules to the Order in Council of 27th November, 1896, will be substituted for them.*

*Article 10 of the Order of the 11th August, 1884, and the Orders dated 30th December, 1884, 24th June, 1885, and 18th August, 1892, will remain in force.*

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## PRELIMINARY.

These Rules shall be followed by all vessels upon the high seas and in all waters connected therewith, navigable by sea-going vessels.

In the following Rules every steam vessel which is under sail and not under steam is to be considered a sailing vessel, and every vessel under steam, whether under sail or not, is to be considered a steam vessel.

The word “steam vessel” shall include any vessel propelled by machinery.

A vessel is “under way” within the meaning of these Rules, when she is not at anchor, or made fast to the shore or aground.

## RULES CONCERNING LIGHTS, &c.

The word “visible” in these Rules, when applied to lights, shall mean visible on a dark night with a clear atmosphere.

Art. 1.—The Rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited.

Art. 2.—A steam vessel when under way shall carry—

- (a) On or in front of the foremast, or if a vessel without a foremast, then in the fore part of the vessel, at a height above the hull of not less than 20 feet, and if the breadth of the vessel exceeds 20 feet, then at a height above the hull not less than such breadth, so, however, that the light need not be carried at a greater height above the hull than 40 feet, a bright white light, so constructed as to show an unbroken light over an arc of the horizon of 20 points of the compass, so fixed as to throw the light 10 points on each side of the vessel, viz., from right ahead to 2 points abaft the beam on either side, and of such a character as to be visible at a distance of at least 5 miles.

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- (b) On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of 10 points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at least 2 miles.
  - (c) On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of 10 points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side, and of such a character as to be visible at a distance of at least 2 miles.
  - (d) The said green and red side lights shall be fitted with inboard screens projecting at least 3 feet forward from the light, so as to prevent these lights from being seen across the bow.
  - (e) A steam vessel when under way may carry an additional white light similar in construction to the light mentioned in subdivision (a). These two lights shall be so placed in line with the keel that one shall be at least 15 feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. The vertical distance between these lights shall be less than the horizontal distance.

Art. 3.—A steam vessel when towing another vessel shall, in addition to her side lights, carry two bright white lights in a vertical line one over the other, not less than six feet apart, and when towing more than one vessel shall carry an additional bright white light six feet above or below such lights, if the length of the tow, measuring from the stern of the towing vessel to the stern of the last vessel towed, exceeds 600 feet. Each of these lights shall be of the same construction and character, and shall be carried in the same position as the white light mentioned in Article 2 (a), except the additional light, which may be carried at a height of not less than 14 feet above the hull.

Such steam vessel may carry a small white light abaft the funnel or aftermast for the vessel towed to steer by, but such light shall not be visible forward of the beam.

Art. 4.—

- (a) A vessel which from any accident is not under command, shall carry at the same height as the white light mentioned in Article 2 (a), where they can best be seen, and, if a steam vessel, in lieu of that light, two red lights, in a vertical line one over the other, not less than six feet apart, and of such a character as to be visible all round the horizon at a distance of at least 2 miles; and shall by day carry in a vertical line one over the other, not less than six feet apart, where they can best be seen, two black balls or shapes, each 2 feet in diameter.
- (b) A vessel employed in laying or in picking up a telegraph cable shall carry in the same position as the white light mentioned in Article 2 (a), and, if a steam vessel, in lieu of that light, three lights in a vertical line one over the other, not less than

six feet apart. The highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character as to be visible all round the horizon, at a distance of at least 2 miles. By day she shall carry in a vertical line one over the other, not less than six feet apart, where they can best be seen, three shapes not less than 2 feet in diameter, of which the highest and lowest shall be globular in shape and red in colour, and the middle one diamond in shape and white.

- (c) The vessels referred to in this Article, when not making way through the water, shall not carry the side lights, but when making way shall carry them.
- (d) The lights and shapes required to be shown by this Article are to be taken by other vessels as signals that the vessel showing them is not under command and cannot therefore get out of the way.

These signals are not signals of vessels in distress and requiring assistance. Such signals are contained in Article 31.

Art. 5.—A sailing vessel under way, and any vessel being towed, shall carry the same lights as are prescribed by Article 2 for a steam vessel under way, with the exception of the white lights mentioned therein, which they shall never carry.

Art. 6.—Whenever, as in the case of small vessels under way during bad weather, the green and red side lights cannot be fixed, these lights shall be kept at hand lighted and ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than 2 points abaft the beam on their respective sides.

To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the colour of the light they respectively contain, and shall be provided with proper screens.

Art. 7.—Steam vessels of less than 40, and vessels under oars or sails of less than 20, tons gross tonnage, respectively, and rowing boats, when under way, shall not be obliged to carry the lights mentioned in Article 2 (a) (b) and (c), but if they do not carry them they shall be provided with the following lights:—

1. Steam vessels of less than 40 tons shall carry:

- (a) In the fore part of the vessel, or on or in front of the funnel, where it can best be seen, and at a height above the gunwale of not less than 9 feet, a bright white light constructed and fixed as prescribed in Article 2 (a), and of such a character as to be visible at a distance of at least 2 miles.
- (b) Green and red side lights constructed and fixed as prescribed in Article 2 (b) and (c), and of such a character as to be visible at a distance of at least 1 mile, or a combined lantern showing

a green light and a red light from right ahead to 2 points abaft the beam on their respective sides. Such lantern shall be carried not less than 3 feet below the white light.

2. Small steamboats, such as are carried by sea-going vessels, may carry the white light at a less height than 9 feet above the gunwale, but it shall be carried above the combined lantern mentioned in sub-division 1 (b).
3. Vessels under oars or sails, of less than 20 tons, shall have ready at hand a lantern with a green glass on one side and a red glass on the other, which, on the approach of or to other vessels, shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.
4. Rowing boats, whether under oars or sail, shall have ready at hand a lantern showing a white light, which shall be temporarily exhibited in sufficient time to prevent collision.

The vessels referred to in this Article shall not be obliged to carry the lights prescribed by Article 4 (a), and Article 11, last paragraph.

Art. 8.—Pilot vessels, when engaged on their station on pilotage duty, shall not show the lights required for other vessels, but shall carry a white light at the mast-head, visible all round the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed fifteen minutes.

On the near approach of or to other vessels they shall have their side lights lighted, ready for use, and shall flash or show them at short intervals to indicate the direction in which they are heading, but the green light shall not be shown on the port side, nor the red light on the starboard side.

A pilot vessel of such a class as to be obliged to go alongside of a vessel to put a pilot on board, may show the white light instead of carrying it at the masthead, and may, instead of the coloured lights above mentioned, have at hand ready for use a lantern with a green glass on the one side and a red glass on the other, to be used as prescribed above.

Pilot vessels, when not engaged on their station on pilotage duty, shall carry lights similar to those of other vessels of their tonnage.

Art. 9.—Fishing vessels and fishing boats, when under way and when not required by this Article to carry or show the lights herein-after specified, shall carry or show the lights prescribed for vessels of their tonnage under way.

(a) Open boats, by which is to be understood boats not protected from the entry of sea water by means of a continuous deck, when engaged in any fishing at night, with outlying tackle extending not more than 150 feet horizontally from the boat into the seaway, shall carry one all-round white light.

Open boats, when fishing at night, with outlying tackle extending more than 150 feet horizontally from the boat into the seaway, shall carry one all-round white light, and in

addition, on approaching or being approached by other vessels, shall show a second white light at least 3 feet below the first light and at a horizontal distance of at least 5 feet away from it in the direction in which the outlying tackle is attached.

- (b) Vessels and boats, except open boats as defined in sub-division (a), when fishing with drift nets, shall, so long as the nets are wholly or partly in the water, carry two white lights where they can best be seen. Such lights shall be placed so that the vertical distance between them shall be not less than 6 feet and not more than 15 feet, and so that the horizontal distance between them, measured in a line with the keel, shall be not less than 5 feet and not more than 10 feet. The lower of these two lights shall be in the direction of the nets, and both of them shall be of such a character as to show all round the horizon, and to be visible at a distance of not less than 3 miles.

Within the Mediterranean Sea and in the seas bordering the coasts of Japan and Korea sailing fishing vessels of less than 20 tons gross tonnage shall not be obliged to carry the lower of these two lights; should they, however, not carry it, they shall show in the same position (in the direction of the net or gear) a white light, visible at a distance of not less than one sea mile, on the approach of or to other vessels.

- (c) Vessels and boats, except open boats as defined in sub-division (a), when line-fishing with their lines out and attached to or hauling their lines, and when not at anchor or stationary within the meaning of sub-division (h), shall carry the same lights as vessels fishing with drift-nets. When shooting lines, or fishing with towing lines, they shall carry the lights prescribed for a steam or sailing vessel under way respectively.

Within the Mediterranean Sea and in the seas bordering the coasts of Japan and Korea sailing fishing vessels of less than 20 tons gross tonnage shall not be obliged to carry the lower of these two lights; should they, however, not carry it, they shall show in the same position (in the direction of the lines) a white light, visible at a distance of not less than one sea mile on the approach of or to other vessels.

- (d) Vessels, when engaged in trawling, by which is meant the dragging of an apparatus along the bottom of the sea--

1. If steam vessels, shall carry in the same position as the white light mentioned in Article 2 (a), a tricoloured lantern so constructed and fixed as to show a white light from right ahead to two points on each bow, and a green light and a red light over an arc of the horizon from 2 points on each bow to 2 points abaft the beam on the starboard and port sides respectively; and not less than 6 nor more than 12 feet below the tricoloured lantern a white light in a lantern, so constructed as to show a clear, uniform, and unbroken light all round the horizon.

2. If sailing vessels, shall carry a white light in a lantern, so constructed as to show a clear uniform and unbroken light all round the horizon, and shall also, on the approach of or to other vessels, show where it can best be seen a white flare-up light or torch in sufficient time to prevent collision.

All lights mentioned in sub-division (d) 1 and 2 shall be visible at a distance of at least 2 miles.

- (e) Oyster dredgers and other vessels fishing with dredge-nets shall carry and show the same lights as trawlers.

- (f) Fishing vessels and fishing boats may at any time use a flare-up light in addition to the lights which they are by this Article required to carry and show, and they may also use working lights.

- (g) Every fishing vessel and every fishing boat under 150 feet in length, when at anchor, shall exhibit a white light visible all round the horizon at a distance of at least one mile.

Every fishing vessel of 150 feet in length or upwards, when at anchor, shall exhibit a white light visible all round the horizon at a distance of at least one mile, and shall exhibit a second light as provided for vessels of such length by Art. 11.

Should any such vessel, whether under 150 feet in length, or of 150 feet in length or upwards, be attached to a net or other fishing gear, she shall on the approach of other vessels show an additional white light at least 3 feet below the anchor light, and at a horizontal distance of at least 5 feet away from it in the direction of the net or gear.

- (h) If a vessel or boat when fishing becomes stationary in consequence of her gear getting fast to a rock or other obstruction, she shall in daytime haul down the day-signal required by sub-division (k); at night show the light or lights prescribed for a vessel at anchor; and during fog, mist, falling snow, or heavy rain-storms make the signal prescribed for a vessel at anchor. (See sub-division (d), and the last paragraph of Article 15).

- (i) In fog, mist, falling snow or heavy rain-storms, drift-net vessels attached to their nets, and vessels when trawling, dredging, or fishing with any kind of drag net, and vessels line fishing with their lines out, shall, if of 20 tons gross tonnage or upwards, respectively, at intervals of not more than one minute make a blast; if steam vessels, with the whistle or syren, and if sailing vessels, with the fog horn; each blast to be followed by ringing the bell. Fishing vessels and boats of less than 20 tons gross tonnage shall not be obliged to give the above-mentioned signals; but if they do not, they shall make some other efficient sound signal at intervals of not more than one minute.

(k) All vessels or boats fishing with nets or lines or trawls, when under way, shall in daytime indicate their occupation to an approaching vessel by displaying a basket or other efficient signal where it can best be seen. If vessels or boats at anchor have their gear out, they shall, on the approach of other vessels, show the same signal on the side on which those vessels can pass.

The vessels required by this Article to carry or show the lights hereinbefore specified shall not be obliged to carry the lights prescribed by Article 4 (*a*), and the last paragraph of Article 11.

Art. 10.—A vessel which is being overtaken by another shall show from her stern to such last-mentioned vessel a white light or a flare-up light.

The white light required to be shown by this Article may be fixed and carried in a lantern, but in such case the lantern shall be so constructed, fitted, and screened that it shall throw an unbroken light over an arc of the horizon of 12 points of the compass, viz., for 6 points from right aft on each side of the vessel, so as to be visible at a distance of at least 1 mile. Such light shall be carried as nearly as practicable on the same level as the side lights.

Art. 11.—A vessel under 150 feet in length, when at anchor, shall carry forward, where it can best be seen, but at a height not exceeding 20 feet above the hull, a white light in a lantern so constructed as to show a clear, uniform, and unbroken light visible all round the horizon at a distance of at least 1 mile.

A vessel of 150 feet or upwards in length, when at anchor, shall carry in the forward part of the vessel, at a height of not less than 20, and not exceeding 40 feet above the hull, one such light, and at or near the stern of the vessel, and at such a height that it shall be not less than 15 feet lower than the forward light, another such light.

The length of a vessel shall be deemed to be the length appearing in her certificate of registry.

A vessel aground in or near a fairway shall carry the above light or lights and the two red lights prescribed by Article 4 (*a*).

Art. 12.—Every vessel may, if necessary, in order to attract attention, in addition to the lights which she is by these Rules required to carry, show a flare-up light, or use any detonating signal that cannot be mistaken for a distress signal.

Art. 13.—Nothing in these Rules shall interfere with the operation of any special rules made by the Government of any nation with respect to additional station and signal lights for two or more ships of war or for vessels sailing under convoy, or with the exhibition of recognition signals adopted by shipowners which have been authorised by their respective Governments and duly registered and published.

Art. 14.—A steam vessel proceeding under sail only, but having her funnel up, shall carry in daytime, forward, where it can best be seen, one black ball or shape 2 feet in diameter.

## SOUND SIGNALS FOR FOG, &amp;c.

Art. 15.—All signals prescribed by this Article for vessels under way shall be given;

1. By "steam vessels" on the whistle or siren.
2. By "sailing vessels and vessels towed" on the fog-horn.

The words "prolonged blast" used in this Article shall mean a blast of from 4 to 6 seconds duration.

A steam vessel shall be provided with an efficient whistle or siren, sounded by steam or some substitute for steam, so placed so that the sound may not be intercepted by any obstruction, and with an efficient fog-horn, to be sounded by mechanical means, and also with an efficient bell.\* A sailing vessel of 20 tons gross tonnage or upwards shall be provided with a similar fog-horn and bell.

In fog, mist, falling snow, or heavy rain-storms, whether by day or night, the signals described in this Article shall be used as follows; viz.:—

- (a) A steam vessel having way upon her shall sound, at intervals of not more than 2 minutes, a prolonged blast.
- (b) A steam vessel under way, but stopped and having no way upon her, shall sound, at intervals of not more than 2 minutes, 2 prolonged blasts, with an interval of about 1 second between them.
- (c) A sailing vessel under way shall sound, at intervals of not more than one minute, when on the starboard tack 1 blast, when on the port tack 2 blasts in succession, and when with the wind abaft the beam 3 blasts in succession.
- (d) A vessel, when at anchor, shall, at intervals of not more than 1 minute, ring a bell rapidly for about 5 seconds.
- (e) A vessel when towing, a vessel employed in laying or in picking up a telegraph cable, and a vessel under way which is unable to get out of the way of an approaching vessel through being not under command, or unable to manoeuvre as required by these Rules, shall, instead of the signals prescribed in subdivisions (a) and (c) of this Article, at intervals of not more than 2 minutes, sound 3 blasts in succession, viz: 1 prolonged blast followed by 2 short blasts. A vessel towed may give this signal and she shall not give any other.

Sailing vessels and boats of less than 20 tons gross tonnage shall not be obliged to give the above-mentioned signals, but if they do not, they shall make some other efficient sound signal at intervals of not more than 1 minute.

\* In all cases where the Rules require a bell to be used, a drum may be substituted on board Turkish vessels, or a gong where such articles are used on board small sea-going vessels.

## SPEED OF SHIPS TO BE MODERATE IN FOG, &amp;c.

Art. 16.—Every vessel shall, in a fog, mist, falling snow, or heavy rain-storms, go at a moderate speed, having careful regard to the existing circumstances and conditions.

A steam vessel hearing, apparently forward of her beam, the fog-signal of a vessel, the position of which is not ascertained, shall, so far as the circumstances of the case admit, stop her engines, and then navigate with caution until danger of collision is over.

## STEERING AND SAILING RULES.

## PRELIMINARY—RISK OF COLLISION.

Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist.

Art. 17.—When two sailing vessels are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other, as follows, viz.:—

- (a) A vessel which is running free shall keep out of the way of a vessel which is close-hauled.
- (b) A vessel which is close-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack.
- (c) When both are running free, with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other.
- (d) When both are running free, with the wind on the same side, the vessel which is to windward shall keep out of the way of the vessel which is to leeward.
- (e) A vessel which has the wind aft shall keep out of the way of the other vessel.

Art. 18.—When two steam vessels are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard, so that each may pass on the port side of the other.

This Article only applies to cases where vessels are meeting end on, or nearly end on, in such a manner as to involve risk of collision, and does not apply to two vessels which must, if both keep on their respective courses, pass clear of each other.

The only cases to which it does apply are, when each of the two vessels is end on, or nearly end on, to the other; in other words, to cases in which, by day, each vessel sees the masts of the other in a line, or nearly in a line, with her own; and by night, to cases in which each vessel is in such a position as to see both the side lights of the other.

It does not apply, by day, to cases in which a vessel sees another ahead crossing her own course; or by night, to cases where the red light of one vessel is opposed to the red light of the other, or where the green light of one vessel is opposed to the green light of the other, or where a red light without a green light, or a green light without a red light, is seen ahead, or where both green and red lights are seen anywhere but ahead.

Art. 19.—When two steam vessels are crossing, so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way of the other.

Art. 20.—When a steam vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam vessel shall keep out of the way of the sailing vessel.

Art. 21.—Where by any of these Rules one of two vessels is to keep out of the way, the other shall keep her course and speed.

*NOTE.—When, in consequence of thick weather or other causes, such vessel finds herself so close that collision cannot be avoided by the action of the giving-way vessel alone, she also shall take such action as will best aid to avert collision.* (See Articles 27 and 29).

Art. 22.—Every vessel which is directed by these Rules to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing the head of the other.

Art. 23.—Every steam vessel which is directed by these Rules to keep out of the way of another vessel shall, on approaching her, if necessary, slacken her speed or stop or reverse.

Art. 24.—Notwithstanding anything contained in these Rules, every vessel, overtaking any other, shall keep out of the way of the overtaken vessel.

Every vessel coming up with another vessel from any direction more than two points abaft her beam, *i.e.*, in such a position, with reference to the vessel which she is overtaking, that at night she would be unable to see either of that vessel's side lights, shall be deemed to be an overtaking vessel; and no subsequent alteration of the bearing between the two vessels shall make the overtaking vessel a crossing vessel within the meaning of these Rules, or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

As by day the overtaking vessel cannot always know with certainty whether she is forward of or abaft this direction from the other vessel, she should, if in doubt, assume that she is an overtaking vessel, and keep out of the way.

Art. 25.—In narrow channels every steam vessel shall, when it is safe and practicable, keep to that side of the fairway or mid-channel which lies on the starboard side of such vessel.

Art. 26.—Sailing vessels under way shall keep out of the way of sailing vessels or boats fishing with nets, or lines, or trawls. This Rule shall not give to any vessel or boat engaged in fishing the right of obstructing a fairway used by vessels other than fishing vessels or boats.

Art. 27.—In obeying and construing these Rules due regard shall be had to all dangers of navigation and collision, and to any special circumstances which may render a departure from the above Rules necessary in order to avoid immediate danger.

#### SOUND SIGNALS FOR VESSELS IN SIGHT OF ONE ANOTHER.

Art. 28.—The words “short blast” used in this Article shall mean a blast of about one second’s duration.

When vessels are in sight of one another, a steam vessel under way, in taking any course authorised or required by these Rules, shall indicate that course by the following signals on her whistle or siren, viz.:—

One short blast to mean, “I am directing my course to starboard.”

Two short blasts to mean, “I am directing my course to port.”

Three short blasts to mean, “My engines are going full speed astern.”

#### NO VESSEL UNDER ANY CIRCUMSTANCES TO NEGLECT PROPER PRECAUTIONS.

Art. 29.—Nothing in these Rules shall exonerate any vessel, or the owner, or master, or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper look-out, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

#### RESERVATION OF RULES FOR HARBOURS AND INLAND NAVIGATION.

Art. 30.—Nothing in these Rules shall interfere with the operation of a special rule, duly made by local authority, relative to the navigation of any harbour, river, or inland waters.

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#### DISTRESS SIGNALS.

Art. 31.—When a vessel is in distress and requires assistance from other vessels or from the shore, the following shall be the signals to be used or displayed by her, either together or separately, viz.:—

In the daytime—

1. A gun or other explosive signal fired at intervals of about a minute;
2. The International Code Signal of distress indicated by N C;
3. The distant signal, consisting of a square flag, having either above or below it a ball or anything resembling a ball;
4. A continuous sounding with any fog-signal apparatus.

At night—

1. A gun or other explosive signal fired at intervals of about a minute;
2. Flames on the vessel (as from a burning tar-barrel, oil-barrel, &c.);

3. Rockets or shells, throwing stars of any colour or description, fired one at a time, at short intervals;
4. A continuous sounding with any fog-signal apparatus.

### STEAM PILOT VESSELS.

A Steam Pilot vessel exclusively employed for the service of Pilots licensed or certified by any Pilotage authority or the Committee of any Pilotage District in the United Kingdom when engaged on her station on pilotage duty and in British Waters, and not at anchor, shall in addition to the lights required for all Pilot boats carry at a distance of eight feet below her White Masthead light a Red light visible all round the horizon and of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least two miles, and also the coloured side lights required to be carried by vessels when under way.

When engaged on her station on Pilotage duty and in British waters and at anchor, she shall carry in addition to the light required for all Pilot boats, the Red light above mentioned but not the coloured side lights.

When not engaged on her station on Pilotage duty she shall carry the same lights as other steam vessels.

### SUMMARY OF LIGHTS ORDERED TO BE CARRIED WHEN UNDER WAY.

Sailing ship.	{ Green light starboard side. Red light port side.
Steamship.	{ Green light starboard side. Red light port side. White light before foremast, not less than twenty feet, nor less than the breadth of ship, above hull
Ship being overtaken by another ship.	{ White light, or flare-up light at stern.
Steamer towing another ship.	{ Green light starboard side. Red light port side. Two white lights, vertically, before foremast.
Sailing ship being towed—	The same as other sailing ships.
Ship laying or picking up a telegraph cable	{ Three lights, in vertical line before foremast, six feet apart, the highest and lowest Red, the middle White.
Ship not under command.	{ Two Red lights in a vertical line before foremast, six feet apart.

Pilot vessels on pilotage duties.	{ White light at mast-head, and at intervals not exceeding 15 minutes a flare-up light.
Pilot vessels when not on pilotage duties	{ The same as other ships.
Open fishing and other open boats.	{ One all-round White light at masthead, and in addition one all-round White light three feet below, at a horizontal distance of at least five feet away in the direction in which the outlying tackle is attached. ;
Fishing vessels employed in drift-net fishing and line fishing.	{ Two White lights in vertical line not less than six feet apart, and horizontal distance not less than five feet in line with keel. The lower being in the direction of the nets or lines. When towing or shooting lines, same lights as ordinary vessels.
Steam Trawlers.	{ Tri-coloured lantern showing White, Red, and Green, and an all-round White light 10 to 12 feet below tri-coloured lantern.
Sailing Trawlers	{ All-round White light and flare-up on the approach of other vessels.

Flare-ups can be shown by all fishing vessels when necessary, but when shown must be in direction of gear.

### **LIGHT ORDERED TO BE CARRIED AT ANCHOR.**

All ships, vessels, boats, and fishing vessels—A bright White light.

If a fishing vessel becomes stationary in consequence of her net fouling a rock or other obstruction, she shall show the light and make the fog signal for a vessel at anchor.

### **OBSERVATIONS ON THE RULES.**

By far the greater number of collisions are undoubtedly caused by bad look-out, by ignorance of the regulations, or by neglect of them.

Under the heads of ignorance and neglect may be included the frequent practice of altering the course prematurely, without having first ascertained *which way* it should be altered, and also, of deviating from your course when it is your duty to keep it.

There are nine cases in which a ship is required to alter course to avoid risk of collision.

1. In a steamship meeting another steamship end on, or nearly end on.
2. In a steamship nearing another on her own starboard side.

3. In a steamship nearing a sailing ship.
4. In a steam or sailing ship overtaking another.
5. In a sailing ship running free nearing a ship close-hauled.
6. In a sailing ship close-hauled on the port tack nearing another close-hauled on the starboard tack.
7. In a sailing ship running free with the wind on the port side nearing another running free with the wind on the starboard side.
8. In a sailing ship running free nearing another to leeward also running free with the wind on the same side.
9. In a sailing ship with the wind aft nearing another sailing ship.

In the *first case only* is no option allowed as to the course to be pursued. The directions are quite distinct; you are to "*alter course to starboard*"; in all other cases you are to "*keep out of the way*."

In the ship giving way, having determined *which way* to alter course to avoid a collision, do so in *good time*. Do not let the people in the other ship imagine that they are not seen, or that the situation is misunderstood, and so, perhaps, tempt them to do something which may bring about a collision. If in the ship holding on, you must be especially careful not to yaw about or steer wildly, but let the giving-way ship see you know that your duty is to keep on your course, and that you intend to do so.

So long as you keep a Green light opposed to a Green light, or a Red light opposed to a Red light, no collision can happen between passing ships.

The reckless use of Port helm leads to collision.

Vice-Admiral DE HORSEY, in his small book on the "Rule of the Road," gives Practical Rules drawn up in accordance with the "Regulations for Preventing Collisions at Sea," which are very clear. He says, "The whole principle of keeping clear of the other vessel consists in taking two bearings with an interval between them to ascertain whether you are or are not converging to the same point."

It may be said, "whilst you are taking your two bearings, with an interval between them, the ships may approach so near as to risk collision." But the reply to this is that, firstly, vessels' lights can be seen at least two miles off in clear weather, and that in thick weather no rules will avail, except such as make slow speed compulsory; and, secondly, that if the plan of taking two bearings will not answer, no other plan will, for it is the only practicable method of ascertaining whether, and which way, to alter course.

"Taking the bearing" has been advocated here because it is the most accurate way, and is not affected by any momentary bad steerage; but it is necessary to explain to the practical seaman that, provided a vessel is steered on a steady course, the more ready method of bringing the other vessel on *with* some part of the rigging or bulwark, and observing whether she draws aft or forward, will equally answer the purpose.

**UNDER SAIL ONLY.****Close-hauled.—On Starboard Tack.****Directions on nearing a vessel.**

Keep your course, but do not steer wildly, lest you should deceive the ship whose duty it is to keep clear of you.

**Close-hauled.—On Port Tack.****Directions on nearing a vessel.**

- 1st. Take bearing.
- 2nd. Ascertain whether a steamer or not.
- 3rd. If a steamer keep your course.
- 4th. If a sailing vessel—
  - (a) If to windward of you, keep your course.
  - (b) If ahead of you, or less than two or three points on the lee bow, keep your course.
  - (c) If to leeward of you, or more than two or three points on the lee bow—
    - 1st. Take bearing again.
    - 2nd. If her bearing has altered materially, and continues so to alter, keep your course.
    - 3rd. If her bearing has not altered materially, tack or bear away until it does so.

**Wind Aft.****Directions on nearing a vessel.**

- 1st. Take bearing.
- 2nd. Ascertain whether a steamer or not.
- 3rd. If a steamer, keep your course.
- 4th. If a sailing vessel—
  - (a) If right astern, or if overtaking you, keep your course.
  - (b) If in any other direction (except right astern, or overtaking you)—
    - 1st. Take bearing again.
    - 2nd. If her bearing has altered materially, and continues so to alter, keep your course.
    - 3rd. If her bearing has not altered materially, alter course sufficiently to starboard or to port to assist to alter her bearing.

**Running Free.—Wind on Starboard Side.****Directions on nearing a vessel.**

- 1st. Take bearing.
- 2nd. Ascertain whether a steamer or not.
- 3rd. If a steamer, keep your course.
- 4th. If a sailing vessel—
  - (a) If to windward of you, or if ahead of you, and going free, or if her Red light only (or her Port side) shows, *provided always she is not close-hauled*, keep your course.
  - (b) If ahead of you and close-hauled, or if to leeward of you, or if her Green light (or her Starboard side) shows, or if you are overtaking her—
    - 1st. Take bearing again.
    - 2nd. If her bearing has altered materially, and continues so to alter, keep your course.
    - 3rd. If her bearing has not altered materially, alter course sufficiently to starboard or port to assist to alter her bearing.

**Running Free.—Wind on Port Side.****Directions on nearing a vessel.**

- 1st. Take bearing.
- 2nd. Ascertain whether a steamer or not.
- 3rd. If a steamer, keep your course,
- 4th. If a sailing vessel\*—
  - (a) If to windward of you, and with the wind on her port side or right aft, keep your course.
  - (b) Under all circumstances—
    - 1st. Take bearing again.
    - 2nd. If her bearing has altered materially, and continues so to alter, keep your course.
  - (c) If she is on your starboard side—
    - 1st. Take bearing again.
    - 2nd. If she has altered her bearing materially, keep your course.
    - 3rd. If her bearing has not altered materially, alter course sufficiently to starboard or port to assist to alter her bearing.

\* This is a case of doubt and danger if you cannot tell on which side the approaching ship has the wind.

**Under Steam.****Directions on nearing a vessel.**

If the approaching vessel (whether she be a Steamer or a Sailing Ship) shows her starboard side, or Green Light only, *to your starboard side*, or *Green Light*—or if she shows her port side, or Red Light only, *to your port side*, or *Red light*, keep your course; but otherwise—

- 1st. Take bearing.
- 2nd. Ascertain whether a steamer or not.
- 3rd. If a steamer—
  - (a) If she is on your port side, keep your course.
  - (b) If she is ahead—
    - 1st. If her Green and mast-head lights only (or her starboard side) show, keep your course.
    - 2nd. If the Red and mast-head lights only (or her port side) show, keep your course.
    - 3rd. If her Green and Red lights both show (or if she is end on, or nearly end on) port your helm and alter course to starboard until you shut out her Green light or starboard side.
- 4th. If a sailing vessel—
  - (a) If she is ahead—
    - 1st. If only one side light shows (*i.e.*, if not end on, nor nearly end on), keep your course.
    - 2nd. If her Green and Red lights both show, or if she is end on, or nearly end on, alter course to starboard or port sufficiently to shut out one of her side lights.
  - (b) If she is not ahead—
    - 1st. Take bearing again.
    - 2nd. If she has altered her bearing materially, keep your course.
    - 3rd. If her bearing has not altered materially, alter course sufficiently to starboard or port to assist to alter her bearing.

**NOTE 1.**—Whether it be your duty or not to alter course, observe Art. 23 of the Regulations, which is as follows:—Every steamship, when approaching another ship so as to involve risk of collision, shall slacken her speed, or stop and reverse, if necessary.

**NOTE 2.**—It is prescribed in Art. 25 of the Regulations, that “in narrow channels every steamship shall, when it is safe and practicable, keep to that side of the fair-way or mid-channel which lies on the starboard side of such ship.”

**NOTE 3.**—For steamships’ optional signals, see Art. 28 of the Regulations.

## AIDS TO MEMORY, IN FOUR VERSES.

BY THOMAS GRAY.

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### 1. *Two Steam Ships meeting.*

When both side lights I see ahead—  
I Port my helm, and show my RED.

### 2. *Two Steam Ships passing.*

GREEN to GREEN—or RED to RED,  
Perfect safety—Go ahead.

### 3. *Two Steam Ships crossing.*

NOTE.—This is the position of greatest danger; there is nothing  
for it but good look-out, caution, and judgment.

If to my starboard RED appear,  
It is my duty to keep clear;  
To act as judgment says is proper—  
To Port—or Starboard—Back—or, Stop her.

But when upon my Port is seen  
A steamer's Starboard light of GREEN,  
For me there's nought to do but see  
That GREEN to Port keeps clear of me.

### 4. *All ships must keep a good look-out, and Steam Ships must stop and go astern, if necessary.*

Both in safety and in doubt  
I always keep a good look-out;  
In danger with no room to turn,  
I ease her!—Stop her!—Go astern.!

## DIAGRAMS TO ILLUSTRATE THE USE OF THE LIGHTS CARRIED BY VESSELS AT SEA,

AND THE MANNER IN WHICH THEY INDICATE TO THE  
VESSEL WHICH SEES THEM, THE POSITION AND DESCRIPTION OF THE  
VESSEL THAT CARRIES THEM.

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*When both Green and Red Lights are seen.*

**A** sees a Red and Green Light ahead :—**A** knows that a vessel is approaching her on a course directly opposite to her own, as **B** (Fig. 1).

If **A** sees a White Mast-head Light above the other two, she knows that **B** is a steam vessel.

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*When the Red and not the Green Light is seen.*

**A** sees a Red Light ahead or on the bow :—**A** knows that either (Fig. 2) a vessel is approaching her on her Port bow, as **B**; or (Fig. 3) a vessel is crossing in some direction to Port, as **DDD**.

If **A** sees a White Mast-head Light above the Red Light, **A** knows that the vessel is a steam vessel, and is either approaching her in the same direction as **B**, or is crossing to Port in some direction as **DDD**.

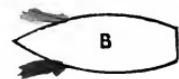
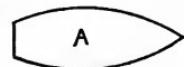
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*When the Green and not the Red Light is seen.*

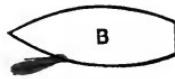
**A** sees a Green Light ahead or on the bow :—**A** knows that either (Fig. 4) a vessel is approaching her on her Starboard bow, as **B**; or (Fig. 5) a vessel is crossing in some direction to Starboard, as **DDD**.

If **A** sees a White Mast-head Light above the Green Light, **A** knows that the vessel is a steam vessel, and is either approaching her in the same direction, as **B**, or is crossing to Starboard in some direction, as **DDD**.

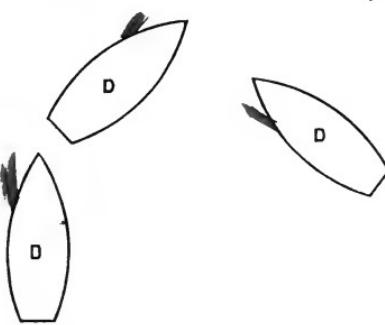
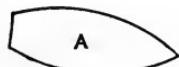
*Fig. 1*



*Fig. 2*



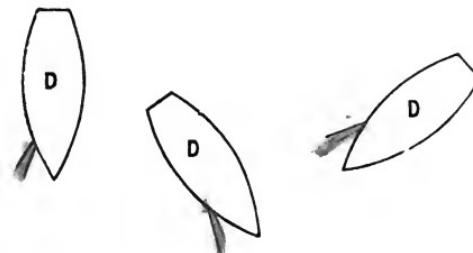
*Fig. 3*

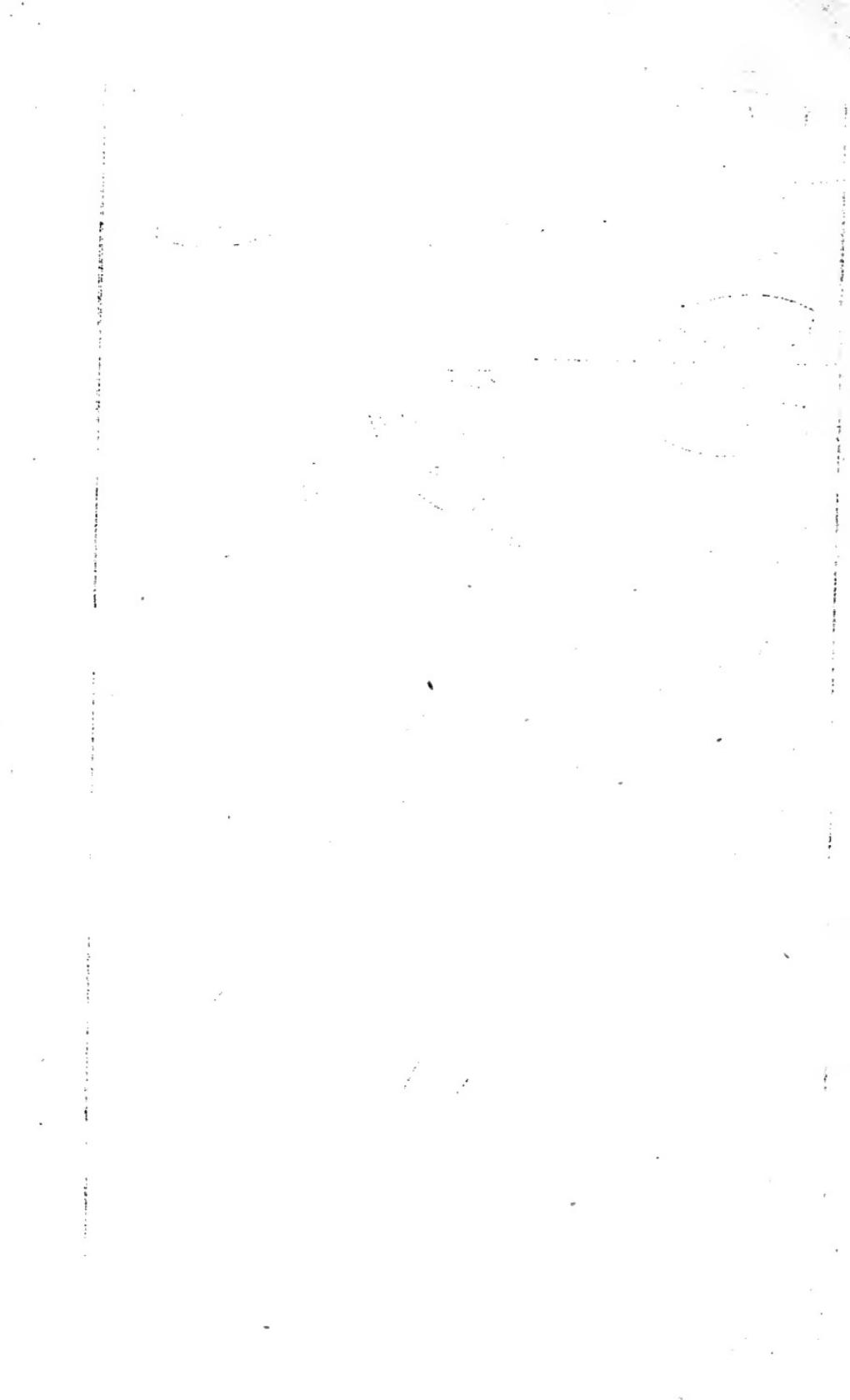


*Fig. 4*



*Fig. 5*





## HEADS OF EXAMINATION, IN REGULATIONS RESPECTING LIGHTS AND FOG SIGNALS, AND IN THE STEERING AND SAILING RULES.

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### *Anchor Lights.*

1.—What light or lights are required by the regulations to be exhibited by sailing vessels at anchor in a roadstead or fairway?

A.—One light only; viz., a white light. Art. 11.

2.—What light or lights are required by the regulations to be exhibited by steam ships in a roadstead or fairway at anchor?

A.—The same as for sailing vessels. Art. 11.

3.—Where is the anchor light to be exhibited?

A.—Where it can be best seen. It must, of course, be placed where there is the least possible chance of obstruction from spars, ropes, &c. Art. 11.

4.—To what height may the anchor light be hoisted?

A.—At a height of not more than 20 feet above the hull. Art. 11.

5.—What is the description of the lantern containing the anchor light required by the regulations?

A.—Globular lantern of eight inches diameter. Art. 11.

6.—In what direction or directions must the anchor light show?

A.—All round the horizon. Art. 11.

7.—At what distance must it be visible?

A.—At least one mile. Art. 11.

### *Sailing Ships' Lights, under way.*

8.—What is the number of lights required by the regulations to be carried by sailing ships when under way at night?

A.—Two. Arts. 5 and 2.

9.—Of what colour are these lights, and how are they to be placed on board the ship?

A.—A green light on the starboard side, and a red light on the port side. Arts. 5 and 2.

10.—Over how many points of the compass, and in what directions, and how far, are they required to show?

A.—Each light must show an uniform and unbroken light over an arc of the horizon of 10 points of the compass; so fixed as to throw the light from right ahead to two points abaft the beam on the starboard and port sides respectively; and of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least two miles. Art. 2, (b) and (c).

11.—Are the side lights required to be fitted with screens; and if so, on what side, and of what length, and how?

A.—Yes; on the inboard side; at least three feet in length measuring forward from the light. They are to be so fitted as to prevent the coloured lights from being seen across the bows. Art. 2, (b), (c), and (d).

12.—What lights are they to carry when being towed at night?

A.—The same. Art. 5.

#### *Steam Ships' Lights, under Steam.*

13.—What is the number of lights required by the regulations to be carried by steam ships when under steam at night?

A.—Three lights. Art. 2.

14.—Of what colour are these lights, and how are they to be placed on board the ship?

A.—White at the foremast-head, green on the starboard side, and red on the port side. Art. 2, (a), (b), and (c).

15.—Over how many points of the compass, in what direction, and how far, is the foremast-head light of a steamer required to show?

A.—Over 20 points, viz., from right ahead to two points abaft the beam on both sides. It must be of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least 5 miles. Art. 2, (a).

16.—Are they required to be fitted with screens, and if so, on which side, and what length?

A.—The green and red lights are to be fitted with screens on the inboard side, extending at least three feet forward from the light, as in the case of sailing vessels. Art. 2, (d).

17.—Over how many points of the compass, in what direction, and how far, are the coloured side lights of steamers required to show?

A.—Each light must be so constructed as to show an uniform and unbroken light over an arc of the horizon of 10 points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard and port sides respectively, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles. Art. 2, (b) and (c).

18.—What description of lights are steamers required by the regulations to carry when they are not under steam, but under sail only?

A.—Side lights only, the same as sailing vessels.

19.—What exceptional lights are to be carried by small sailing vessels in certain cases?

A.—Whenever, as in the case of small vessels during bad weather, the green and red lights cannot be fixed, these lights shall be kept on deck on their respective sides of the vessel ready for instant exhibition, and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side, nor the red light on the starboard side.

To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the colour of the light they respectively contain, and shall be provided with suitable screens. Art. 6.

21.—What description of light are sailing pilot vessels required to carry?

A.—Sailing pilot vessels are not to carry coloured side lights, but a white light visible all round the horizon (like an anchor light), and to burn a flare-up at intervals not exceeding 15 minutes. Art. 8.

22.—What lights are open boats and fishing boats required to carry?

A.—Open fishing boats, with outlying tackle extending more than 150 feet horizontally from the boat into the seaway, shall carry one all-round white light, and, in addition, on approaching or being approached by other vessels, shall show another such light at least 3 feet below the first light at a horizontal distance of at least 5 feet away from it in the direction of the gear. Art. 9.

Fishing vessels and open boats when at anchor, or attached to their nets and stationary, shall exhibit a bright white light, and in fog, mist, or falling snow, shall make the fog signal for vessels at anchor.

23.—May open boats use a flare-up?

A.—Yes, whenever necessary. Art. 9.

24.—What is the day signal for a vessel fishing with nets, lines, or trawls?

A.—They must show a basket or other efficient signal where it can best be seen. If vessels or boats have their gear out when at anchor, they shall, on the approach of other vessels, show the same signal on the side on which those vessels can pass.

25.—What lights are steam ships required to carry when towing other ships?

A.—Steam ships, when towing other ships, shall carry two bright white mast-head lights vertically, in addition to their side lights, so as to distinguish them from other steam ships. Each of these mast-head lights shall be of the same construction and character as the mast-head light which other steam ships are required to carry? Art. 3.

#### *Fog Signals.*

26.—Are sailing vessels required to use any signals when at anchor or when sailing in thick weather or in a fog; and, if so, what are they?

A.—Yes; a fog-horn and a bell. Art. 15 (*c* and *d*).

27.—When is each sort of signal to be used?

A.—The mechanical fog horn is to be sounded when under way in a fog, making when on the starboard tack one blast, when on the port tack two blasts, and when with the wind abeam three blasts. The bell when in a fog and not under way. Art. 12 (*c* and *d*).

28.—How often are the fog signals of sailing vessels to be sounded?

A.—As often as necessary, but at least once every minute. Art. 15 (*c* and *d*).

29.—Are steam ships required to use any signals in a fog or in thick weather; and, if so, what are they?

A.—Yes; a steam whistle or other efficient steam sound signal, a mechanical fog-horn, and a bell. Art. 15.

30.—When is each signal to be used?

A.—The steam whistle to be sounded when under way, and the bell when not under way.

31.—**How often** are the fog signals of steamers to be **sounded**?

A.—As often as necessary, but every two minutes at least. Art. 15.

32.—**Where** is the **steam signal** to be **placed**?

A.—So placed that the sound may not be intercepted by any obstruction. Art. 15.

33.—What other precaution is to be observed by steamers when steaming in a fog?

A.—The regulations require that steam ships in a fog shall go at a moderate speed. Art. 16.

34.—What precaution is to be taken by steamers approaching another vessel?

A.—If there is risk of collision, the steamer is to slacken speed, or if necessary to stop and reverse. Art. 23.

35.—If you see a **white light alone**, **what does it denote** as regards the ship carrying it?

A.—It denotes the presence of a vessel at anchor; or a pilot vessel; or a fishing vessel attached to her nets; or it may be the foremast-head light of a vessel under steam, with her side lights not within sight on account of distance, fog, &c.

36.—If you see a **green** or a **red light without a white light**, or **both a green and a red light without a white light**, is the vessel carrying the light or lights seen a **vessel under steam** or a **vessel under sail**?

A.—A vessel under sail; if *red* light is seen the vessel shows me her *port* side (Arts. 2 (c) and 5); but if the *green* light is seen the vessel shows me her *starboard* side. Arts. 2 (b) and 5.

37.—How do you know it is a vessel under sail?

A.—Because there is no white light at the foremast-head.

[The Examiner will then take one model of a vessel, which he will place on the table and call it A. He will then take the mast or stand with a white and a red ball on it, and place it at the other end of the table, and call it B.

The Examiner will use the model of one vessel only when the questions numbered 38 to 48 are asked.]

The first thing to be done on observing the coloured light of another vessel is to take its bearing, and from the point *opposite* to that bearing to reckon ten points to the right or left, according to the colour of the light.

This will be the ten-point arc over which a coloured light is visible, upon some point of which the vessel exhibiting the light must be sailing.

(a) **Rule for a Red Light.**—*Take the opposite to its bearing, and facing this direction count ten points from it towards your right hand.* (R in red as R in right).

(b) **Rule for a Green Light.**—*Take the opposite to its bearing, and facing this direction count ten points from it towards your left hand.*

Or, perhaps, the following Rules may be preferred by some. I would suppose myself looking from the centre of the compass in the direction of the light; then—

(c) **Rule for a Red Light.**—*The vessel showing a red light is steering between nearly the opposite to the bearing of the light and six points to the left of the bearing.*

(d) **Rule for a Green Light.**—*The vessel showing a green light is steering between nearly the opposite to the bearing of the light and six points to the right of the bearing.*

38.—You see a steamer's green light bearing North, how is she going, and how do you know? Rules (b) and (d).

A.—The bearing of the light is North; I take the opposite point to the bearing (N.), which is South, and, facing this direction, allow ten points from it (S.) to the left hand, which gives E.N.E.; whence the ten-point arc over which the green light is visible is from South (a little easterly) to E.N.E. Or, by the other rule (d), I take the opposite point to the bearing, as before, viz., South, then reckoning six points to the right of the bearing gives E.N.E., as before.

**NOTE.**—It will be observed that in Rules (a) and (b) the ten points are reckoned from the point opposite to the bearing; but in Rules (c) and (d) the six points are to be counted to the right or left, as the case may be, of the bearing itself, not the opposite point to it.

39.—You see a steamer's red light bearing North, how is she going, and how do you know? Rules (a) and (c).

A.—From South (a little westerly) to W.N.W. Take the opposite point to North (the bearing), which gives South, and allow ten points to the right of this (S.), which is W.N.W.; whence the ten-point arc over which the red light in this instance is visible is from South (a little westerly) to W.N.W. Or, by the other rule, take the opposite point to the bearing, viz., South, and count six points to the left of the bearing, which gives W.N.W.; whence the included arc over which the red light is visible from South (a little westerly) to W.N.W.

40.—You see a steamer's red light bearing S.W.; between what points is she going? Rules (a) and (c).

A.—Between N.E. and S.S.E. Taking the opposite point to the bearing (S.W.) gives N.E.; then, facing N.E., allowing ten points to the right of N.E. gives S.S.E.; whence the included arc over which the red light is visible is from N.E. to S.S.E. Or, by the other Rule (d)—The opposite point to the bearing is N.E. (as before); then, counting

six points to the *left* of the bearing (S.W.) gives S.S.E., whence from N.E. to S.S.E. is the ten-point arc (as before) over which the light is visible.

41.—A is a steamer steering North, and sees a **green** light two points on his **starboard bow**; how is the ship carrying that light steering?

A.—Between S.S.W. (nearly) and East.

42.—How do you know?

A.—Because these are the only ten points in which her green light can be seen when she is two points on my starboard bow when I am steering North.

43.—You are still steering North, you see a **red** light two points on your **starboard** bow; how is the ship carrying that light steering?

A.—Between S.S.W. (nearly) and N.W.

44.—If B's lights are seen *four points* on your *starboard bow*?

A.—Between a little to the West of S.W. round to N.N.W.

45.—A sees the red and white lights of B *two points* before his (A's) starboard beam?

A.—Between a little to the West of W.S.W. round to North.

46.—What should A do in all these cases, and why?

A.—Keep out of B's way, because A passes B on his starboard side.

47.—You are steering North, a **green** light is **two points** on your **port bow**, how is the vessel carrying that light steering?

A.—The vessel carrying the green light is steering between S.S.E. (nearly) and N.E.

48.—You are steering North, and you see a red light two points on your port bow, how is the vessel showing the red light steering?

A.—She is steering between S.S.E. (nearly) and West.

49.—If a steamer A sees the *three* lights of another steamer B ahead or nearly ahead, are the two steamers meeting, passing, or crossing?

A.—Meeting end on, or nearly end on.

50.—If A is going North, within what points of the compass must the vessel B showing the white and red lights be steering?

A.—B must be going from a little W. of S. to W.N.W.

51.—A is a steamer going North, and seeing a **white** and **green** **light ahead.** Are A and B meeting, or is B passing A, or is B crossing the course of A, and in what direction; and how do you know?

A.—B is passing to starboard of A, because if I see a green light ahead I know that the head of the vessel carrying that green light must be pointing away in some direction to my starboard or right hand. The ship showing the green light has her right or starboard side more or less open to me.

52.—As A is going North, within what points of the compass must the vessel showing the white and green lights be steering?

A.—B must be going from S. a little easterly to E.N.E.

53.—Do the regulations expressly require the helm of a ship to be put to port in any case?

A.—No; port helm is not mentioned anywhere in the "Steering and Sailing Rules." In the case of two ships meeting end on or nearly end on the words used are "keep out of the way" and "alter her course to starboard." Arts. 18 and 19. Repeat the proper rhyme.

54.—If you port to a green light ahead, or anywhere on your starboard bow, and if you get into collision by doing so, do you consider that the regulations are in fault?

A.—No, because the regulations do not expressly require me to port in such a case, and because by porting I know that I should probably and almost certainly run across the other vessel's path, or run into her.

55.—If a steamer A sees another steamer's red light B on her own starboard side, are the steamers meeting, passing, or crossing, and how do you know?

A.—Crossing, because the red light of one is opposed to the green light of the other; and whenever a green light is opposed to a red light, or a red light to a green light, the ships carrying the lights are crossing ships.

56.—Is A to stand on, and if not, why?

A.—A has the other vessel B on her own starboard side. A knows she is crossing the course of B because she sees the red light of B on her (A's) own starboard side. A also knows she must get out of the way of B, because Article 19 expressly requires that the steamer that has the other on her own starboard side shall keep out of the way of the other, and the other steam ship has to keep her course, according to Article 21, subject, however, to Articles 16 and 27.

57.—Is A to starboard or to port in such a case?

A.—A must do what is right so as to get herself out of the way of B; she must starboard if necessary, or port if necessary; and she must stop and reverse if necessary.

58.—If A gets into collision by porting, will it be because she is acting on any rule?

A.—No; the rule does not require her to port. If she ports, and gets into collision by porting, it is not the fault of any rule.

**NOTE.**—The rules do not prescribe the manner in which vessels are to keep out of the way of each other, only it must be according to the practice of seamen, and whenever it is necessary to do so, care must be taken that the course adopted will be such as to avoid bringing about a collision.

59.—If a steamer A sees the **green light** of another steamer B on her own (A's own) **port bow**, are the two steamers **meeting, passing, or crossing**, and how do you know?

A.—Crossing, because the green light of one ship is shown to the red light of the other.

60.—What is A to do, and why?

A.—By the rule contained in Article 19 of the Regulations, A is required to keep her course, subject only to the qualification that due

regard must be had to all dangers of navigation; and that due regard must also be had to any special circumstances which may exist in any particular case rendering a departure from that rule necessary in order to avoid immediate danger. The crossing ship B on A's port side must get out of the way of A, because A is on B's starboard side. Arts. 19, 21, and 30. Repeat the proper rhyme.

61.—What should B do, and why?

A.—Keep out of my way (Art. 19), because he has me on his own starboard side.

62.—A, a steamer, sees the **green light** of another steamer, B, a point on her, A's, **port bow**. Is there any regulation requiring A to port in such a case, and, if so, where is it to be found?

A.—There is not any. A keeps her course, with caution. Art. 21. Repeat the proper rhyme.

63.—Are steam ships to get out of the way of sailing ships?

A.—If a steamer and a sailing ship are proceeding in such direction as to involve risk of collision, the steamer is to get out of the way of the sailing ship. Art. 20.

64.—What is to be done by A, whether a steamer or sailing ship, if overtaking B?

A.—A is to keep out of the way of B, either port or starboard, whichever is best under the circumstances. Art. 24.

NOTE.—If two steam ships are on converging courses, one abaft the beam of the other, in such a position that the hinder ship cannot see the side light of the leading ship, the former, if going at a greater speed than the latter, is to be considered as a vessel overtaking the other vessel.

65.—Suppose a ship is overhauling you, what would you do?

A.—Keep my course, and show a white light or a flare-up light over the stern.

66.—When by the rules one of two ships is required to keep out of the way of the other, what is the other to do?

A.—To keep on her course.

67.—Is there any qualification or exception to this?

A.—Yes. Due regard must be had to all dangers of navigation, and to any special circumstances which may exist in any particular case to avoid immediate danger.

68.—Is there any general direction in the steering and sailing rules, and if so, what is it?

A.—Yes, it is this: that nothing in the rules shall exonerate any ship, or the owner, master, or crew thereof, for the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper look-out, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

69.—It is a fog, mist, or falling snow, you suddenly see another ship in such a position that there is danger of collision, what would you do?

A.—Do whatever is most likely to prevent collision. If I directed my course to starboard I would give *one short blast* on my steam whistle; if to port, *two short blasts*; and if to full speed astern, *three short blasts*.

70.—You suddenly see a steamer's red light on your starboard bow and another steamer's green light on your port bow, what would you do?

A.—Ease, stop, and reverse; give three short blasts on my steam whistle.

#### *Steamers and Sailing Ships.*

71.—You are in a steamer, and you see both side lights of a sailing ship right ahead; what would you do?

A.—I would keep out of the way. Art. 18.

72.—If you see the red light of a sailing vessel on your starboard bow, what would you do?

A.—I would keep out of the way. Art. 18.

73.—If you see the green light of a sailing ship on your port bow, what would you do?

A.—I would keep out of the way. Art. 18.

74.—If you see a sailing ship's red light on your port bow, what would you do?

A.—Keep my course. See GRAY's rhyme.

75.—You see a sailing ship's green light on your starboard bow, what would you do?

A.—Keep my course. See GRAY's rhyme.

#### *Sailing Ships.\**

76.—A sailing ship A is close-hauled on the port tack, and B is a sailing ship close-hauled on the starboard tack; which keeps out of the way?

A.—The ship A being on the port tack gives way. Art. 17 (b).

77.—A is free and B is close-hauled; which gives way?

A.—The vessel A gives way. Art. 17 (a).

78.—A is close-hauled and B is free; which gives way?

A.—B gives way. Art. 17 (a).

79.—A has the wind on the port side, B on the starboard side, both ships going free; which vessel gives way?

A.—A gives way. Art. 17 (c).

\* **The Steering and Sailing Rules** only mention ships as being close-hauled, having the wind free, or having the wind aft.

In considering what constitutes the difference between a ship close-hauled and one going free, it is necessary to draw the line somewhere, and notwithstanding that it may clash with received notions on this point, we may, for all practical purposes, consider a ship with the wind abeam as a close-hauled vessel; and this interpretation, while it will in no case lead to error, will make several cases clear, which on the other supposition, viz., that a ship with the wind abeam is a ship going free, have been exceedingly ambiguous and unsatisfactory.

80.—The ships A and B are both on the same tack, but A is to windward; which gives way?

A.—A keeps out of the way. Art. 17 (*d*).

81.—A has the wind aft, B has the wind on the beam; which keeps out of the way?

A.—The vessel A keeps clear. Art. 17 (*a*).

82.—A ship is close-hauled on the port tack, and the wind is S.S.W., what course is she steering, allowing six points for the direction of the wind?

A.—West.

83.—A ship is close-hauled on the starboard tack, and the wind is N.W., what course is she steering?

A.—W.S.W.

84.—Close-hauled on the starboard tack, with the wind E.N.E., what course is she steering?

A.—North.

85.—The wind is S.E. by E., what course would a ship be steering if she were close-hauled on the port tack?

A.—S. by W.

86.—Suppose the wind to be N.E. by N., what course would a ship be steering if she were close-hauled on the port tack?

A.—E. by S.

87.—A green light bearing E.S.E. disappears, how was the ship going at the time?

A.—Six points to the right of E.S.E., namely, South.

88.—You see a red light bearing N. by W., it disappears, how was the ship going at the time?

A.—Six points to the left of N. by W., namely, W. by N.

### **To find within what points a sailing ship must be steering when her Red or Green side light is visible.**

The first thing to be done on observing the coloured light of another vessel is, as before stated, to take its bearing, and from the point opposite to that bearing to reckon ten points to the right or left, according to the colour of the light.

This will be the ten-point arc over which a coloured light is visible, upon some point of which the vessel exhibiting the light must be sailing.

The next thing is to consider whether the wind will allow the vessel exhibiting such light to proceed over the whole of this arc, or only over a portion of it; this ascertained will give the direction in which she is proceeding.

There remains but to apply the rule bearing on the particular case.

**NOTE.**—In all these exercises the ship is always supposed to be able to lie within 6 points of the wind.

89.—A is a steamer going North, with the wind at West, and suddenly sees a *red* light *two* points on his (A's) port bow; within what points must the sailing ship be steering?

A.—The *red* light bears N.N.W. from A, the opposite point to which is S.S.E., then facing this direction and counting ten points to the *right* gives West; hence the included arc over which the *red* light is visible is between S.S.E. and West.

90.—A is a steamer going W.N.W., the wind at S. by E., and sees a *green* light *four* points on his starboard bow; within what points of the compass must this sailing ship be steering?

A.—The light being four points on A's starboard bow while she is heading W.N.W., the light, therefore, bears N.N.W. The opposite point to N.N.W. is S.S.E.; then, facing this direction and reckoning ten points to the *left* of it, we have N.E., hence the included arc over which the *green* light is showing is from S.S.E. to N.E. The wind being S. by E. the only possible courses for the sailing vessel to steer then is from E. by S. to N.E.

91.—A sailing ship A, going free with the wind on the starboard side, sees the red light of a sailing ship B on his starboard side; which ship keeps out of the way?

A.—The sailing ship B keeps out of the way.

92.—Why?

A.—Because B *may* have the wind on the same side, and is, therefore, the weather ship, and "she shall keep out of the way," (Art. 17 (d); she *may* have the wind aft, and, therefore, "she shall keep out of the way," (Art. 17 (e); or, she *may* have the wind on her port side, and, therefore, "she shall keep out of the way," (Art. 17 (e).

93.—A sailing ship A, with the wind on her starboard side, sees the green light of another sailing ship B on A's own port side, which ship keeps out of the way?

A.—A keeps out of the way of the other ship B.

94.—Why does A keep out of the way?

A.—The sailing ship A *may* have the wind on the same side as B, and A "shall keep out of the way," (Art. 17 (d); A *may* have the wind aft, and, therefore, "she shall keep of the way," (Art. 17 (e); or, A *may* have the wind on the port side, and, therefore, "she shall keep out of the way," (Art. 17 (e).

95.—A sailing ship A, close-hauled on the starboard tack, sees the green light of another sailing ship B on his port bow, which vessel keeps out of the way?

A.—The vessel B is on the port tack close-hauled, and must keep out of the way. Art. 17 (a and b).

NOTE.—If B's green light is abaft the beam, or abeam, he must have the wind on the starboard side, and A being to windward keeps clear.

96.—A sailing ship A, with the wind on the starboard beam, sees the red and green lights of a sailing ship B right ahead, which ship keeps out of the way?

A.—The sailing ship B keeps out of the way. Art. 17 (c).

97.—A sailing ship A, having the wind on the port beam, sees the red and green lights of a sailing ship B right ahead, what must A do?

A.—Keep out of the way. Art. 17 (c).

98.—A is steering North, with the wind on the port beam, sees B's red light broad on the starboard bow, which vessel keeps out of the way?

A.—A keeps out of the way, being the weather ship. B must either be close-hauled on the port tack, or he must be in stays. In either case A must keep out of the way. Art. 17 (a).

99.—A is steering North, close-hauled, wind on port side, and sees B's red light on her (A's) starboard side, which vessel keeps out of the way?

A.—If B's red light should be anywhere between two points abaft A's beam and aft, B must have the wind on her port side, and A being to windward, by Art. 17, shall keep out of the way; but if B's red light be anywhere between two points before the beam and right ahead, when B must either have the wind on the starboard side, and is probably close-hauled, or he is in stays, by Art. 17, A keeps out of the way.

100.—A is a ship steering North, with the wind free on the **starboard** side, and sees a **red** light **three** points on her (A's) **starboard** bow; which ship keeps out of the way?

A.—The arc of visibility is from S.W. by S. (nearly) to N.W. by N., and the wind admits of the vessel proceeding on any of these points, but she may be close-hauled or free. A ship going free, by the rule, keeps out of the way of one close-hauled; and the question is—can the vessel showing the red light be close-hauled or not? If she be close-hauled, A keeps out of the way; if she is not close-hauled, A keeps her course.

**NOTE.**—If we consider a ship with the wind from anything abaft the beam to within two points right aft as a ship with the wind free, then if the wind should be E. by S., A is going free. In the former case, however, the other vessel could not be close-hauled, and A should keep her course; in the latter case, with the wind so far aft as S.E. by S., the other vessel may be close-hauled (not necessarily so), but A should give her the benefit of the doubt and give way by altering her course to starboard, as if the other vessel should be going free such a course would involve no risk of collision.

It is evident, then, that the direction of the wind is an element in the solution of the question, “Is A to keep her course, or keep out of the way”? and a point of the utmost importance when it is free on the starboard side and a red light is seen anywhere on the starboard bow.

101.—A is a ship going North, with the **wind aft**, and sees a **red** light three points on her (A's) **starboard bow**.

A.—The light is visible from S.W. by S. (nearly) to N.W. by N., but as the wind is South, the vessel exhibiting it can only be proceeding between W.S.W. and N.W. by N. She may, therefore, be close-hauled or free; in either case A keeps out of the way. Art. 17 (e).

102.—You are in a steamer A, it is a fog, mist, or falling snow, and she suddenly sees another ship in such a position that there is danger of collision, what should A do?

A.—Whatever is most likely to avoid collision. If I directed my course to starboard I would give one short blast on my steam whistle; if to port, two short blasts; and if full speed astern, three short blasts.

103.—A suddenly sees another steamer's red light on her (A's) starboard bow, and another steamer's green light on her port bow; what should A do?

A.—Ease, stop, and reverse; give three short blasts on the steam whistle.

104.—What do breaches of the regulations imply?

A.—If an accident happens through non-observance of the regulations it implies wilful default on the part of the person in charge of the deck at the time, unless it is shown to the satisfaction of the Court hearing the case that the special circumstances of the case rendered a departure from the rules necessary.

105.—If collision ensues from a breach of the regulations, who is to be deemed in fault for the collision?

A.—The person by whom the regulations are infringed, unless the Court hearing the case decides to the contrary.

106.—Do the regulations apply to seagoing ships in harbours and in rivers?

A.—Yes; unless there is any rule to the contrary made by a competent authority.

107.—Do they apply to British ships only?

A.—No, to foreign ships as well.

108.—Is one ship bound to assist another in case of collision?

A.—Yes.

109.—What is the penalty for default?

A.—If the master or person in charge of the ship fails to render assistance without reasonable excuse, the collision is, in absence of proof to the contrary, to be deemed to be caused by his wrongful act, neglect, or default.

110.—Is there any other penalty attached to not rendering assistance?

A.—Yes. If it is afterwards proved that he did not render assistance, his certificate may be cancelled or suspended by the Court investigating the case.

111.—Is it not expected that you should understand the regulations before you take charge of the deck of a ship?

A.—It is.

112.—Why?

A.—If I do not understand them, and am guilty of default, the consequences will be very serious to me.

113.—What would be a very serious offence?

A.—To cause a collision by porting the helm when not required to port by the regulations and without due consideration.

114.—In case of a collision what would you do ?

A.—Get clear as soon as possible, ascertain what damage I had received, and whether the ship was making water.

115.—What next ?

A.—Give what assistance I could to the other ship. Give the master or person in charge of the other vessel my ship's name and port of registry, and also the names of the ports and places from which and to which she is bound. Have all the crew as witnesses. Ask her name and port of registry.

116.—You are in a steamer at night time, she breaks down; what is the first thing you would do ?

A.—I would haul down the mast-head light.

117.—You are going along in a sailing vessel and see a fishing boat ahead, would you go to leeward or to windward of her ?

A.—I would go to leeward of her.

## WEIGHTS AND MEASURES.

### MEASURE OF LENGTH.

12	Inches	=	1 Foot.
3	Feet	=	1 Yard.
5½	Yards	=	1 Rod, or Pole.
40	Poles	=	1 Furlong.
8	Furlongs	=	1 Mile.

### PARTICULAR MEASURES OF LENGTH.

A Nail	=	2½ Inches	{	Used for measuring cloth of all kinds.
Quarter	=	4 Nails.		
Yard	=	4 Quarters		
Ell	=	5 Quarters		
Hand	=	4 Inches	{	Used for the height of horses.
Fathom	=	6 Feet		Used in measuring depths.
Link	=	7·92 Inches	{	Used in Land Measure to facilitate computation of
Chain	=	100 Links		the content, 10 sq. chains being equal to an acre.

### MEASURE OF SURFACE.

144	Square Inches	=	1 Square Foot.	40	Perches	=	1 Rood.
9	Square Feet	=	1 Square Yard.	4	Rood	=	1 Acre.
30½	Square Yards	=	1 Perch, or Rod.	640	Acres	=	1 Square Mile.

### MEASURES OF SOLIDITY AND CAPACITY.

#### SOLIDITY.

1 Cubic Foot	=	1728 Cubic Inches.	1 Cubic Yard	=	27 Cubic Ft., 21·033 bushels.
1 Stack of Wood	=	108 Cubic Feet.	1 Shipping Ton	=	40 Cubic Ft., merchandise.
1 Shiping Ton	=	42 Cubic Feet of Timber.			
1 Ton of displacement of a Ship	=	35 Cubic Feet.			

## CAPACITY FOR ALL LIQUIDS.

4 Gills	=	1 Pint	=	34·65925	Cubic Inches.
2 Pints	=	1 Quart	=	69·3185	
4 Quarts	=	1 Gallon	=	277·274	
2 Gallons	=	1 Peck	=	554·548	
8 Gallons	=	1 Bushels	=	2218·192	
8 Bushels	=	1 Quarter	=	10·26936	Cubic Feet
5 Quarters	=	1 Load	=	51·34681	

The four last denominations are used for dry goods only. For liquids, several denominations have been heretofore adopted, viz.:—For Beer, the Firkin of 9 gallons, the Kilderkin of 18, the Barrel of 36, the Hogshead of 54, and the Butt of 108 gallons. For Wine and Spirits, there are the Anker, Runlet, Tierce, Hogshead, Puncheon, Pipe, Butt, and Tun; but these may be considered rather as the names of the casks in which such commodities are imported, than as expressing any definite number of gallons. It is the practice to gauge all such vessels, and to charge them according to their actual content. Flour is sold, nominally, by measure, but actually by weight, reckoned at 7 lbs. avoirdupois to a gallon.

## WATER FOR SHIPS.

Tun 210 gallons.	Butt 110 gallons.	Puncheon 72 gallons.
Barrel 36 gallons.		Kilderkin 18 gallons.

## CAPACITY FOR COALS, &amp;c.

2 Gallons	=	1 Peck	=	704	Cubic Inches, nearly.
8 Gallons	=	1 Bushel	=	2815 $\frac{1}{2}$	
3 Bushel	=	1 Sack	=	4 $\frac{5}{8}$	
12 Sacks	=	1 Chaldron	=	58 $\frac{2}{3}$	Cubic Feet, nearly.

The goods are to be heaped up in the form of a cone, to a height above the rim of the measure of at least  $\frac{3}{4}$  of its depth. The outside diameter of measures used for heaped goods are to be at least double the depth; consequently, not less than the following dimensions:—

Bushel 19 $\frac{1}{2}$ Inches.	Peck 12 $\frac{1}{4}$ Inches.	Half-gallon 7 $\frac{3}{4}$ Inches.
Half-bushel 15 $\frac{1}{2}$ , ,	Gallon 9 $\frac{3}{4}$ , ,	

The Imperial Gallon contains exactly 10 lbs. avoirdupois of pure water; consequently, the Pint will hold 1 $\frac{1}{4}$  lb., and the Bushel 80 lbs.

## MEASURE OF WEIGHT.

## AVOIRDUPOIS WEIGHT.

27 $\frac{1}{2}$ Grains	=	1 Dram	=	27 $\frac{1}{2}$	Grains.
16 Drams	=	1 Ounce (oz.)	=	437 $\frac{1}{2}$	
16 Ounces	=	1 Pound (lb.)	=	7000	
14 Pounds	=	1 Stone (st.)			
28 Pounds	=	1 Quarter (qr.)			
4 Quarters	=	1 Hundredweight (cwt.)			
20 Cwt.	=	1 Ton,			

## TROY WEIGHT.

24 Grains	=	1 Pennyweight	=	24
20 Pennyweights	=	1 Ounce	=	480
12 Ounces	=	1 Pound	=	5760

Grains.

These are the denominations of Troy Weight when used for weighing gold, silver, and precious stones (except diamonds).

For scientific purposes the grain only is used; and sets of weights are constructed in decimal progression from 10,000 grains downwards to  $\frac{1}{100}$  of a grain.

By comparing the number of grains in the Avoirdupois and Troy pound and ounce respectively, it appears that the Troy pound is less than the Avoirdupois in the proportion of 144 to 175; but the Troy ounce is greater the Avoirdupois in the proportion of 192 to 175.

oz. dwts. grs.	oz. dwts. grs.
1 lb. Avoirdupois = 14 11 15½ Troy.	1 dr. Avoirdupois = 0 1 3½ Troy
I oz. , = 0 18 5½ ,	

The *carat*, used for weighing diamonds, is  $3\frac{1}{2}$  grains. The term, however, when used to express the fineness of gold, has a relative meaning only. Every mass of alloyed gold is supposed to be divided into 24 equal parts; thus the standard for coin is 22 carats fine, that is, it consists of 22 parts of pure gold and 2 parts of alloy.

## APOTHECARIES WEIGHT.

20 Grains	=	1 Scruple.	8 Drams	=	1 Ounce.
3 Scruples	=	1 Dram.	12 Ounces	=	1 Pound.

The grain, ounce, and pound are the same as in Troy Weight.

## ANGULAR MEASURE, OR DIVISIONS OF THE CIRCLE.

60 Seconds	=	1 Minute.	90 Degrees	=	1 Quadrant.
60 Minutes	=	1 Degree.	360 Degrees	=	1 Circumference.
30 Degrees	=	1 Sign.			

## MEASURE OF TIME.

60 Seconds	=	1 Minute.	28, 29, 30, or 31 Days	=	1 Calender Month.
60 Minutes	=	1 Hour.	12 Calendar Months	=	1 Year.
24 Hours	=	1 Day.	365 Days	=	1 Common Year.
7 Days	=	1 Week.	366 Days	=	1 Leap Year.
28 Days	=	1 Lunar Month.	365½ Days	=	1 Julian Year.
			365 Days, 5 Hours, 48 Minutes, 45½ Seconds	=	1 Solar Year.

In 400 years, 97 are leap years, and 303 common.



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